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The management and regulation of the beneficial use of sewage sludge as an agricultural soil amendment in Riverside County

William Ernst Prinz

THE MANAGEMENT AND REGULATION OF THE BENEFICIAL USE OF SEWAGE SLUDGE AS AN AGRICULTURAL SOIL AMENDMENT IN RIVERSIDE COUNTY

A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Public Administration

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ABSTRACT

How did community activists force the Riverside County Government to regulate the land application of sewage sludge as an agricultural soil amendment? Changes in the perception of environmental issues by the public and government have created a social context where inputs to the political system are no longer the exclusive privilege of elitist groups. Easton's theory explains how inputs to the political system result in policy outputs. Jones' theory describes the sequence of functional activities necessary for a problem to become a public policy. California Environmental Health Directors were mailed a survey to compare their experiences regarding policy development and implementation in regulating the beneficial reuse of sludge. The survey showed that the majority of local policies resulted from demands by grassroots activists. Mazmanian and Sabatier provide the conceptual framework explaining the implementation process as to why Ordinance 696 has been an effective public policy. The project concludes with recommendations to improve the ordinance.

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CHAPTER ONE

Introduction

Riverside County Department of Environmental Health is the local government agency responsible for regulating the beneficial use of sewage sludge. Sewage sludge, also called biosolids, is the residue from the treatment of domestic and industrial sewage that accumulates at municipal sewage treatment plants. Riverside County Ordinance 696 (696) regulates the beneficial use of sewage sludge as an agricultural soil amendment. This mandate resulted from inputs by citizen-activists of the Palo Verde Valley that forced the County of Riverside to respond to their demands. They required public officials to take steps to control the use of sewage sludge as a soil amendment that created a nuisance in their community and posed threats to human health and the environment.

This Graduate Research Project answers two questions relating to Ordinance 696. First, regarding inputs into the political system:

- How did the citizen activists of the Palo Verde Valley force Riverside County Government to develop and

implement a policy to regulate the land application of sewage sludge?

The second question is evaluative and focuses on the outputs or results of the County's policy:

- Is 696 effectively implemented to protect public health and the environment?

A subsidiary question on political authority:

- Should the land application of sludge be regulated by local government to most effectively protect human health and the environment?

Hypotheses

Question #1's hypothesis is: *Grassroots activists have successfully influenced local governments to make environmentally oriented policy decisions regulating the land application of sewage sludge.* This question is important because in a democratic society one needs to consider how issues get on to the public decision making agenda. Few issues reaching the governmental agenda actually become public policy.[1]

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[1] Walter A. Rosenbaum, *Environmental Politics and Policy*, Third Edition, (Washington, D.C: CQ Press, 1995) 86.

The second question's hypothesis is: *Local government programs in California that regulate the land application of sewage sludge, use a comprehensive approach to address the problem to ensure protection of public health and the environment.* Local programs have taken a comprehensive approach in that they consider all aspects of the land application process such as issuing permits, monitoring an applicator's activities, regulating transportation of sludge, as well as sampling and testing biosolids and soils to assure the material is safe for this use. This question is important because for a policy to be effective it must deliver the promised "product". Bardach describes policy implementation as an "assembly process". Where the policy is the "blue print for a large machine that was to turn out rehabilitated psychotics or healthier old people or better-educated children or more effective airplanes or safer streets."[2] In this case study the product is assuring that

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[2] Eugene Bardach, *The Implementation Game: What happens after a Bill Becomes Law*, (Cambridge, MA: MIT Press, 1977) 36.

biosolids are used in a manner that benefits agriculture while protecting public health and the environment.

Additionally hypotheses are included here that relate to the questions in the survey instrument:

- *The majority of responding jurisdictions will identify their surrounding environment as being Suburban/Rural or Rural/Agricultural.*
- *In jurisdictions where the land application of sludge occurs it is utilized as a agricultural soil amendment rather than a land reclamation soil amendment.*
- *The majority of respondents will occasionally (five to ten times per year) receive complaints from the public about the land application of sludge.*
- *The majority of respondents will state that there has been some grassroots activism in their jurisdiction to have local government regulate this activity.*
- *The majority of cities and counties responding to this questionnaire will state that they have <u>not</u> adopted an ordinance to regulate the land application of sewage sludge in their jurisdiction.*

- *The majority of jurisdictions that have adopted a sludge regulation ordinance have done so as a result of political pressure.*
- *The majority of agencies that have an ordinance to regulate sludge have a mechanism for issuing permits to persons with adequate qualifications.*
- *The majority of jurisdictions will report that they issue a permit to one or more of the following parties: Sewage sludge transporters, sewage sludge applicators, and/or land owners.*
- *The survey will indicate that it is common practice for an ordinance to require the inspection of sludge transportation vehicles.*
- *Due to the expense of laboratory tests it is unlikely that most local jurisdictions can afford, and therefore do not practice, the periodic testing of sludge that is applied to fields.*
- Few jurisdictions engage in periodic field soil testing due to the high laboratory costs.

- *It is a common practice among jurisdictions regulating sludge application to enforce set-back requirements.*

- *Most jurisdictions establish resting periods (i.e. site restrictions) that limit the time between the placement of sludge and the harvesting of crops or entry by the public.*

- *Fees for permit processing and annual permit renewal will provide the bulk of funding for most local sludge regulation programs.*

- *Jurisdictions having their own sludge ordinances or possessing some local mechanism to regulate the land application of sludge will tend to disagree or strongly disagree that the State should have the primary role in regulating the land application of sludge.*

- *A majority of jurisdictions with local regulations will concur that their agencies should have primary control over regulating sludge re-use rather than State agencies.*

- *Counties and cities will agree that the level of protection they provide is adequate regardless of whether or not they have an ordinance.*

Reasons for Research and Methodology

My interest in this topic is to gather information for revising Ordinance 696. I was assigned this task by my employer, the County of Riverside Department of Environmental Health.

To understand the initial development of 696 I reviewed documents in the Department's files. The staff reports, letters and publications uncovered the "paper trail" of the Department's role in developing this ordinance. Newspaper articles provided an outsider's view of the actions leading to the development of this ordinance.

The Environmental Protection Agency has published numerous reports on their regulations that were invaluable in gaining a technical perspective on the land application of sludge. The scientific literature on this topic was also a key source of background information.

To place Ordinance 696 in the historical and social context of our nation's democratic continuum the influence of the environmental movement was studied. The way Americans and the United States government views nature and the environment has changed in recent decades to empower ordinary citizens to voice concerns and influence governmental actions.

Public policy literature provided the theoretical basis for how stakeholders get their views placed on the government agenda. Public policy literature provided the impetus for the survey questionnaire that was mailed to fifty-three Environmental Health Directors in California. The survey compared Riverside County's experiences and actions regarding the land application of sludge with other jurisdictions. The survey discovered that citizen activism had played a role in developing policies in other jurisdictions as well as explaining how other jurisdictions implement their sludge management policies.

Implementation theory also is helpful in evaluating the outputs of government and in analyzing the results of the survey. The localities that regulate the use of sludge

were asked to respond to a series of questions about how they implement their sludge management programs. Comparing the practices of other jurisdictions is determinant toward evaluating and arriving at the appropriate level of government intervention in the practice of landspreading sludge.

The survey and research described above have been helpful in evaluating Ordinance 696 and provided useful information for suggested improvements to this policy which are discussed in the final chapter. It is easy for people to spend all their time and energy studying the past and never examine where local government is going and whether or not it is reaching its goals and objectives effectively and efficiently.[3] One of the objectives of this project is to obtain information to determine how Ordinance 696 can better achieve its policy goal of balancing the risks and benefits of the land application of biosolids.

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[3] B.W. Rapp and F.M. Patitucci, *Managing Local Government for Improved Performance: A Practical Approach*, (Colorado: Westview Press, 1977) 344.

The Pros and Cons of the Land Application of Sludge

The regulation of sewage sludge began with the United States Congress enacting the Clean Water Act (CWA) in 1972 in order to, "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[4] Since the CWA was adopted the amount of sewage sludge has almost doubled. The United States Environmental Protection Agency (EPA) estimated in 1989 that approximately 15,300 Publicly Owned Treatment Works (POTWs) generate 7.0 million dry metric tons of sewage sludge annually or approximately 47 pounds of dry solids per person per year.[5] If the total amount of municipal sewage sludge produced in the United States were applied to cropland at agronomic rates less than 2% of the nation's cropland would be necessary to accept it.[6]

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[4] *Clean Water Act*, U.S. Code, Vol. 33, sec. 101(A) (1972).

[5] U.S. Environmental Protection Agency, 40 CFR, Part 257 et al. "Standards for the Use and Disposal of Sewage Sludge; Final Rules," *Fed. Reg.*58:32 (1993).

[6] National Research Council, *Use of Reclaimed Water and Sludge in Food Crop Production* (Washington, D.C. National Academy Press, 1996) 39.

The objective of the federal codes and regulations is to balance the beneficial use of sludge with its risks[7]. In 1977, amendments to the CWA were passed by Congress that directed the EPA's Office of Water to form a Sludge Task Force. Their duty was to formulate guidelines to: identify uses of sludge, including disposal; specify factors to be taken into account in determining methods and practices applicable to each of these identified uses; and identify concentrations of pollutants that would interfere with each use.[8] In 1987, Congress again amended the CWA to require the EPA to reduce the potential environmental risks of sludge to the environment in balance with beneficial uses. The regulations resulting from this congressional act was Part 503; this final rule was published in 40 CFR in 1993 as the "Standards for the Use and Disposal of Sewage Sludge".[9]

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[7] U.S. Environmental Protection Agency. 40 CFR Part 257 et al. "Standards for the Use and Disposal of Sewage Sludge; Final Rules," *Fed. Reg.*58:32, page 9248 (1993).

[8] Ibid. 9250

[9] Ibid.

The Benefits of Utilizing Biosolids as a Soil Amendment

In 1989-90 the USEPA estimated that approximately 36% of the sludge generated in the U.S. was applied to agricultural land.[10] Sludge, when applied to agricultural land provides numerous advantages for the grower by supplying plant nutrients such as nitrogen, phosphorous, and trace elements. The benefits derived from the use of sludge solids as a soil enhancer has been studied by the USEPA. It was found that the cost savings from sludge application increased could be increased by as much as $100-140 per acre.[11] These figures were compared to traditional fertilizers and the results varied with agricultural practices. However, the actual financial benefit to farmers is debatable.[12]

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[10] U.S. Environmental Protection Agency. 40 CFR Part 503. "National Sewage Sludge Survey" *Fed. Regist.* 54:23 (1989).

[11] Environmental Protection Agency *Beneficial Technology for a Better Environment,* (Washington, D.C., Office of Water, EPA 832-R-9-4-009, June 1994) as cited by National Research Council, 35.

[12] National Research Council, 35.

Proponents of beneficial use of biosolids have demonstrated that soils tilled for decades often become deficient in trace metals such as zinc, copper, and iron which are required for plant growth. Application of biosolids replenishes depleted nutrients.[13] When used *properly* biosolids can boost crop yields by as much as 35% after one application without the use of other types of fertilizers.[14]

Additionally, there have been no reported outbreaks of infectious disease associated with a population's direct or indirect (food chain consumption pathway) exposure to properly treated and distributed biosolids use on agricultural land. When used at Part 503 levels the use of

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[13] D.C. Martens and D.T. Westerman, *Fertilizer Applications for Correcting Micronutrient Deficiencies in Agriculture*, ed. J.J. Mortved, et. al. (Madison, WI: American Society of Agronomy, Soil Science Society of America Book Series No. 4, 1991).

[14] Gene Logsdon, "Beneficial Biosolids", *Biocycle: Journal of Waste Recycling*, (34(2) February 1993) 43-44 and Terry J. Logan and Rufus L. Chaney, "Utilization of Municipal Wastewater and Sludge on Land--Metals", ed. A.L. Page, et al. *Utilization of Municipal Wastewater and Sludge on Land* (Riverside, CA, University of California, 1983) 235.

sludge as a soil amendment may be considered safe to the public, plants, and animals.[15]

The Risks of Utilizing Biosolids as a Soil Amendment

However, not everyone is so optimistic about the benefits of biosolids. Sewage sludge emits fouls odors and attracts flies which are a nuisance to residences and citizens in the vicinity of its use. Pollutants contained in sludge such as heavy metals, polychlorinated biphenyls (PCBs), dioxins and pathogenic microorganisms may be present at critical levels. These constituents are toxic to fauna and flora, cause disease in humans and animals, and degrade the environment. Special concerns arise when crops grown in sludge amended soil are eaten directly by people or fed to livestock and dairy cattle whose products may enter the human food chain.[16] For example, the waiting period between the application of sludge to pasture land

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[15] National Research Council, 95.

[16] A. Dam Kofoed, in *Utilization of Sewage Sludge on Land: Rates of Application and Long-Term Effects of Metals*. ed. S. Berglund, et al. "The Use of Sludge on Arable Land", D. Reidel Publishing Company: Dordrecht, Holland. 20.

and the allowance of animal grazing may be too short to prevent the transmission of tapeworm to cattle.[17]

Some researchers believe that Part 503, which is more permissible than international standards, could allow the accumulation of trace metals such as chromium, cadmium, copper, lead, mercury, and nickel to levels exceeding 10 to 100 times greater than background levels.[18] Leeper states that, "It is no light matter to decide to multiply the naturally occurring burden of heavy metals in soils by a factor of 3 to 4".[19]

Although Part 503 regulates the concentrations of metals and pathogens in sludge it does not regulate the concentrations of organic or toxic contaminants. PCBs are of concern since 19% of the sludges evaluated by the EPA had detectable levels of this class of organic compounds.[20]

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[17] National Research Council, 95.

[18] M. B. McBride, "Toxic Metal Accumulation from the Agricultural Use of Sludge: Are USEPA Regulations Protective?", *Journal of Environmental Quality*, (24 January -February, 1995) 5.

[19] G.W. Leeper, *Managing the Heavy Metals on the Land*, (New York: Marcel-Dekker, 1978) as cited by McBride, Ibid. 16.

[20] National Research Council, 136.

Part 503 applies one standard to the vast array of soils and sludges found in the United States. These difference affect the safe retention of metals in organic matrixes in the soil or promotes their release into the environment increasing their availability to plants, animals, and humans.[21]

As this brief discussion of the costs and benefits of biosolids use indicates Part 503 has become the working standard and guidance document for State and local governments despite its deficiencies. Still, there needs to be more research on the variety of circumstances under which sludge may be applied to soils to protect public health and the environment as well as the future use of farmland. The public needs assurance that sludge, when used properly, provides the highest level of protection possible.

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[21] McBride, 16.

How Sludge Exploded into a Political Issue in Riverside County

Prior to the promulgation of Part 503 disposal of sludge in the ocean was common. The Ocean Dumping Ban Act of 1988 prohibited sludge disposal in coastal waters. This created a crisis for some of the large sewage treatment plants in the Los Angeles metropolitan area which relied on the offshore jettison of their residues. A mad scramble began to find alternative disposal methods in southern California where there was a dearth of regulatory guidance from the State or Federal governments.

For Riverside County, the use of sludge became a political crisis when a biosolids land applicator stockpiled sludge transported from Los Angeles for use by a dry land farmer in the Palo Verde Valley in the eastern border of the County. The foul odors and flies caused an uproar in the nearby Colorado River community: protesters carried placards and barricaded trucks to prevent sludge deliveries.[22] Responding to the pressure the Board of

[22] Rachelle Garcia, "Residents Speak Minds". *Palo Verde Times,* 9 February 1990.

Supervisor's demanded that the Health Department react to the situation, so a cease and desist order was issued to halt sludge dumping.[23] But rather than creating a law to ban outright the use of sludge as some other rural counties have done, Riverside opted to take the best information and regulatory guidance available to create Ordinance 696. This law has become a model for other counties seeking to take the progressive approach of regulating sludge as a beneficial material that, when *properly* applied, can be utilized in a fashion that affords reasonable protection of public health and the environment.

The regulatory milieu that existed when 696 was adopted was based on state and federal regulations having little emphasis on the agricultural use of sludge. The Code of Federal Regulations (40 CFR), Part 257 (September 1979) treated sludge as a solid waste intended for landfill disposal while providing minimal guidance to local government regulators on the beneficial use of biosolids. The California Department of Health Service's "Manual of

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[23] Kathy Hyduke-Spraggins, "Sludge, Pelicans Cause Problems in Palo Verde" *Palo Verde Times*, 28 February 1990.

Good Practice for Landspreading of Sewage Sludge" provided guidance for beneficial uses of sludge without granting any regulatory authority.[24] It was from this void that the Department of Environmental Health initially drafted Ordinance 696 (Appendix A).

The regulatory confusion created a situation that was ripe for crises. Neither State nor local agencies were able to address the many problematic issues associated with the land application of sludge. When sludge and people "interfaced" in the Palo Verde Valley the citizens cried foul and sludge management was politicized to a degree that could not be ignored. It soon became incumbent upon Riverside County to arrive at a creative solution to the problem.

The citizen's reaction to this situation is but one example of the larger issue of the change in social mores that has occurred over the past several decades. The following chapter examines the historical and social changes that empowered citizens to speak out on environmental issues.

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CHAPTER 2

The Roots of the Modern Environmental Movement

Few issues can awaken a tranquil community into action more than an environmental controversy. This is so whether it is a hazard to health and safety, an imagined fear with no scientific basis, or a threat to property values. An environmental controversy can stir passions and galvanize otherwise law-abiding citizens into a pack of crazed environmentalist extremists. Individuals of all ideological stripes can find themselves bound together to focus their energies into a powerful political force. The modern environmental movement, which began over three decades ago, provides the context for local environmental action. However, this movement is not just a contemporary phenomena. Its roots can be traced back to the nineteenth century.

Americans have not always held such a deep regard for how human activities impact nature or their health. The notion that nature will absorb and recover from all industrial disruptions was strongly entrenched in American culture. The commercial prosperity of our nation's western

expansion and industrialization was once symbolized by smoke stacks, strip-mined land, and polluted rivers. The nation's resources seemed limitless and provided the promise of prosperity to all who were willing to work hard at getting it.[1]

In the early nineteenth century Thomas Jefferson and John Quincy Adams promoted the frontier economy through their ideal of the liberal oriented yeoman culture. Jefferson believed that the most stable and prosperous economy was formed by prosperous farmers. The frontier economy became a potent symbol of freedom and independence. The vision of free land for the pioneer combined economic liberalism with the aim of supporting an agricultural based economy on the free, non-rent paying farmer.[2] However, farming, the industrial revolution and the good things they produce, if not properly managed can also contribute to environmental degradation. The imperative for protecting

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[1] Bruce Piasecki and Peter Asmus, *In Search of Environmental Excellence: Moving Beyond Blame*, (New York: Simon and Schuster, Inc., 1990) 32.

[2] Anna Bramwell, *Ecology in the 20th Century: A History*, (New York: Yale University Press, 1989) 71.

the environment was not always as obvious as it is today. During the early days of our nation the effects of environmental degradation were often obscured by the dust and smoke of agricultural and industrial growth.

Nurturers of the Earth

The Conservation Movement of the late nineteenth and early twentieth centuries was spearheaded by far sighted leaders in science, technology, and government who were concerned about the reckless exploitation of natural resources. They were seeking to bring about more efficient utilization of the country's physical assets. They were concerned about the impacts caused by the growth imperative of unrestrained capitalism. The goals of the movement came from the top down. It was brought about primarily from the leaders: those who already possessed political and economic power and were able to influence the government's policies and oppose the industrial barons regarding appropriate resource management.[3]

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[3] Samuel P. Hays, *Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985,* (Cambridge: Cambridge University Press, 1987) 13.

The conservationist movement can be described by the Shepherd Model. The term Shepherd is used allegorically: A shepherd cares about the well-being of the flock and protects it, while the flock provides the shepherd with wool and mutton so that he/she can makes a living. Because humankind partakes of the earthly bounty they should help nurture the earth rather than despoil it. This picture provides for a bridge between the prevailing culture of the day, that was founded on a creed of economic expansion, and the conservationist's nurturing approach to the careful use of the earth's resources. Though the conservationists had their opponents, their views did not represent a radical departure from the status quo.[4] Their views were compatible with the growth imperative of capitalism but called for greater efficiency as well as a more farsighted approach to the extraction of resources from nature.

Nature for Nature's Sake

Another group of conservation-minded idealists were more concerned with preservation of the natural environment

[4] Bramwell, 8.

for its own sake. John Muir described the purveyors of unbridled growth as, " . . .these temple destroyers, devotees to ravaging commercialism . . ."[5] Conservationists promoted protection of the wilderness and the beauty of nature as an end in itself; they considered these to be resources that should be spared from human endeavors that would forever alter the created world. They formed organizations dedicated to influencing government and educating the public about the need to set aside unspoiled lands.

Muir founded the Sierra Club in 1892 to preserve the pristine beauty of Yosemite for future generations to enjoy. This organization was, and still is, a major advocate of environmental protection and wilderness preservation. Gifford Pinchot served as the first chief executive of the U.S. Forest Service in 1905 under President Theodore Roosevelt and promoted stewardship of woodland resources. The Audubon Society and the Izaak

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[5] Kirkpatrick Sale, *The Green Revolution: The American Environmental Movement 1962-1992*, (New York: Hill and Wang, 1993) 14.

Walton League were organized to fight for guardianship of wildlife habitat as well as human enjoyment of the great outdoors.[6] These leaders and their groups were influencing the nation's policy from the top down without a broad consensus. Yet they laid the foundation, provided much of the inspiration, and planted the seeds for the ethical shift in how the populous would view the environment and man's impact upon it.

Technophiles and Technophobes

The boom years following World War II witnessed tremendous industrial growth and technological innovation that was fueled by a period of unprecedented economic expansion. The "Synthetic Revolution" saw the creation of new artificial products to exert the human advantage over nature more effectively and efficiently than ever before. The power of the atom was unleashed with the promise of an unlimited energy source coupled with the threat of total destruction. The development of chemical and biological weapons escalated warfare to a heightened level of terror.

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[6] Sale, 5.

Chemical "weapons" to fight the enemies of agriculture, such as insects and weeds, were devised. Synthetic hormones and fertilizers promised to improve the modern yeoman's output. It seemed as though there was not anything that people could not do to manipulate nature into serving their purposes more completely and thoroughly.

Yet despite this feeling of power and the wave of optimism surrounding these advances there was also an undercurrent of anxiety among ordinary citizens and concerned scientists about what we may be doing to ourselves and to the planet. Scientists expressed caution about the unrestricted use of synthetic chemicals that resulted in new classes of wastes for which safe disposal methods had not been developed. These unknowns brought on a subconscious sense of collective dread that was waiting to be tapped into by the right spokesperson.

The Beginning of the Modern Environmental Movement

In 1962 Rachel Carson, a marine biologist and popular writer, authored a runaway bestseller that sparked the modern environmental movement. *Silent Spring* drew from the

cumulative fear felt deep within the national psyche.[7] Many writers and scholars such as Kirkpatrick Sale, Paul Hawkin, Samuel Hays, and Kent E. Portney, to name but a few, consider this book to be responsible for the birth of the modern environmental movement.[8]

Silent Spring not only raised the nation's consciousness regarding the extent of pesticide pollution but also began to broaden the base of environmental concern. Influence on the political system was not only expressed from the top-down by the upper echelon of society as it had been in the past but new political pressures were being exerted from the bottom-up. The public had been energized through increased awareness to take action to protect the environment. The dawning of the environmental movement also occurred within the context of the larger

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[7] Rachel L. Carson, *Silent Spring*, (New York: Houghton Mifflin, 1962).

[8] Sale, 3; Paul Hawken, *The Ecology of Commerce: A Declaration of Sustainability*, (New York: HarperCollins Publishers, Inc., 1993) 30; Hays, 52; Kent E. Portney, *Controversial Issues in Environmental Policy: Science vs. Economics vs. Politics*, (Newbury Park, CA: Sage Publications, 1992) 37.

social changes that emerged in the 1960s. Concern for the environment was swept along with the fury of the civil rights movement, the resistance to the Vietnam War, and other cultural attacks on the establishment during that turbulent period.

The Evolution of the Modern Environmental Era - The First Era

Environmentalism permeated the American consciousness and manifested itself through a gradual metamorphosis over the last thirty years into a significant political force.

Rosenbaum divides the modern environmental movement into two Eras intersected by the years of the Reagan presidency. The first era, starting in the 1960s through the 1970s, was characterized by a dramatic shift in national policy toward the environment. Significant bipartisan legislation was enacted to protect the water, land, and air from wanton pollution by industry and government as well as the passage of bills to preserve the wilderness.[9]

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[9] Walter A. Rosenbaum, *Environmental Politics and Policy*, (Washington D.C. CQ Press, 1991) 4; Norman J. Vig, "Presidential Leadership and the Environment: From Reagan and Bush to Clinton", ed. Norman J. Vig and Michael E.

Sale splits Rosenbaum's Era I into two distinct segments. The first segment begins with the publication of Silent Spring and ends with the first Earth Day on April 22, 1970. He sees the primary emphasis of this period as a shift from wilderness conservation to protection of human settlements. Sale's second segment commences with the decade of the 1970s until the Reagan presidency in 1981 and is characterized by Washington as the chief battleground with legal reformism being the main effort. There was also a new perception of an approaching doomsday; environmental concerns began to take on a global perspective and placed the human race on the endangered species list.[10]

Hays marks this period as a time where large scale environmental disasters affirmed the fears of the populous. In 1969, the Santa Barbara oil spill from offshore drilling by Union Oil saw the destruction of wildlife. No people were killed or injured in this incident but the public outcry motivated many citizens to climb on the

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Kraft, *Environmental Policy in the 1990s,* Second Edition ((Washington D.C: CQ Press, 1994) 74,75.

[10] Sale, 8.

environmental band wagon. Other polarizing incidents include: The tanker Torrey Canyon spilled 117,000 tons of crude oil into the English channel, the Cuyahaga River burst into flames from the dumping of flammable chemicals, along with the assessment of Lake Erie as "a dying sinkhole". With each ecological incident the base of the environmental movement became increasingly broad.[11]

Though the Reagan years were generally viewed to be eight years of regulatory relief for industry as funding for pollution fighting agencies was cut and enforcement activities were relaxed it was also a period of increased legal action and widespread local activism.[12] This backlash motivated the larger environmental organizations, such as the Sierra Club and the Audubon Society, to use their local chapters to channel resources to support local efforts thus increasing their clout in lobbying the legislature and administrative agencies.

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[11] Hays, 52.

[12] Rosenbaum, 4.

The Second Environmental Era

Rosenbaum describes Era II as the time following the Reagan "gap" period. Environmental concerns during the 1990s have taken on a global focus with the destruction of the rain forests, depletion of the Earth's protective ozone layer, and global warming. Politically however, the movement has matured. The Natural Resources Defense Counsel and the Sierra Club Legal Defense Fund polished their lawsuit strategies and have become formidable courtroom forces to attack environmental issues. Also the body of scientific knowledge about the environment has grown providing for more precise definitions of ecological problems. The increased sophistication also brings with it a greater skepticism regarding the credibility and managerial skills of scientists and public officials and other spokespersons in public affairs.[13] This increased knowledge has raised the level of public debate on environmental issues.

[13] Ibid., 5, 27.

Grassroots Movements

Concerns with hazardous waste and toxic chemicals were brought to the forefront at the Love Canal in Niagara Falls, New York where Hooker Chemical legally discharged toxic waste in a manner that endangered the health of local residents. Carelessness on the part of industry and the inability or unwillingness of government to act gave rise to a new grassroots environmentalism. This created possibilities for the decentralization of social and political concerns about the environment.[14]

Lois Gibbs, a housewife in the Love Canal neighborhood, gained national attention by establishing the Citizen's Clearinghouse for Hazardous Wastes (CCHW) in 1981 to assist local groups in fighting hazardous waste and other projects of environmental concern. This organization disseminates information to grassroots activists organized around local issues such as siting hazardous waste facilities, fighting groundwater pollution from landfills, dumping of industrial chemicals and heavy metals, municipal

[14] Ibid., 55.

trash incinerators and the landspreading of sewage sludge. Otherwise docile citizens have rallied around these ecological focal points through letter writing campaigns, door -to door solicitation, demonstrations, sit-ins, etc. By the fall of 1986 the CCHW had a network of 1,300 groups, by the end of the decade there were no fewer than 7,000.[15]

The Environmental movement has emphasized the importance of participatory democracy, decentralized political power, and has strengthened the grassroots base for political advocacy. The grassroots environmental movement has become a countervailing power against the establishment. This increased base of public participation has impacted policies, laws, and administrative regulations at all levels of government. The judiciary has been challenged by complaints filed by citizens against projects and practices that threaten the public's well-being.[16]

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[15] Sale, 59-60.

[16] Rosenbaum, 22;

Environmental Democracy Versus Corporate Elitism

The public's increased participation has also led to increased opposition to major energy, industrial, and waste management projects that were once considered vital to the nation's economic growth and well-being.[17] Siting issues have typically not been defined as national issues while more political controversy is generated locally than nationally on these matters.[18] The NIMBY (Not in My Back Yard) syndrome describes the passionate opposition expressed by ordinary citizens who have effectively prevented the location of undesirable industries slated for development near their neighborhoods.

The causes of NIMBYism are described by Mazmanian and Morrell as an, ". . . inherent imbalance in the distribution of costs and benefits".[19] The costs of one

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[17] Daniel Mazmanian and David Morrell, "The 'NIMBY' Syndrome: Facility Siting and the Failure of Democratic Discourse", ed. Norman J. Vig and Michael Kraft, *Environmental Policy in the 1990s*, 2nd Ed., (Washington D.C: CQ Press, 1994) 223.

[18] Al Gore, *Earth in the Balance: Ecology and the Human Spirit*, (New York: Houghton Mifflin Company, 1992) 145.

[19] Mazmanian and Morrell, 234.

project are accrued in one locale while the benefits are shared across a broader area.[20] For example, the costs of locating a landfill in Community A will negatively impact the lifestyle of the residents in that community. However, Community B, the source of most of the garbage entering the landfill, receives the benefits by having the waste exported out of town. The externalities of one area are imported to another area, usually to a community with a weaker political voice.

The exportation of externalities also produces benefits for corporate elite that exert enormous pressures on the political system at all levels. Kann describes the influence of elitist groups (corporate entities) as being, ". . . both destructive and anti-democratic".[21] At stake, Kann continues, is the public interest, " . . . the expressed desires of the American people" and that ". . .

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[20] Ibid.

[21] Mark E. Kann, "Environmental Democracy in the United States", Chapter 11, ed. Sheldon Kamieniecki, Robert O'Brien, and Michael Clarke, *Controversies in Environmental Policy*, (Albany, NY: State University of New York Press, 1986) 253.

since the beginning of the twentieth century, corporate elite have had a stake in using their power to define the 'public interest' in ways that emphasize material expansion and silence environmental concerns".[22]

The environmental movement will continue to struggle to protect the nation's air, land, and waters with activism at the federal, state, and local levels. NIMBYs and corporate interests will continue to be at loggerheads as the current Republican majority attempts to deregulate environmental protection.[23]

However, the Republican majority may have overestimated the public's desire for environmental deregulation while miscalculating their demands for strengthened environmental protection. Proposals that would allow for the destruction of wetlands, attempts to stymie the Environmental Protection Agency through budget cuts, and other threats to environmental protection have

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[22] Ibid., 257, 258.

[23] John Flicker, "Local Voices in a National Debate" *Audubon*, January-February 1996, page 6.

become a political wedge between the major parties.[24] The environment has not ceased to be a significant political issue.

A Local Example of Grassroots Activism

The subject of this project -- the land application of sludge in Riverside County and the citizens that rallied to push local government response to this practice -- repeats a scenario that has become common in environmental politics. In this case the environmental ethic came into conflict with a traditional American cultural value: the property rights of the farmer to practice agriculture and its impact on citizen's enjoyment of their lifestyle free from nuisances and potential health threats.

This case also presents an internal "clash" of values within the environmental movement. Waste recycling is a paradigm that is cherished by environmentalists. Sludge, a waste product from municipal sewage treatment, has worth as a soil amendment. Instead of dumping sludge in the ocean, where it is a source of pollution, or in a landfill where

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[24] Ken Miller, "Suddenly, Environment is Huge Issue for Presidential Hopefuls", *The San Bernardino County Sun*, Thursday, June 20, 1996, page A4.

its benefits are forever lost as well as being a source of ground water contamination, land application of biosolids transforms sludge from a waste to a commodity: But is recycling always environmentally friendly? Is land application of sludge really recycling or is it just a shell game contrived by the waste industry to move a noxious material from one venue to another?

The decision makers of Riverside County decided that, yes, land application could be a legitimate re-use of sludge but that it had to be carefully scrutinized by a watchdog over which the Board had some immediate administrative control: the Department of Environmental Health. The concerned citizens in opposition to the farmers that desire to use biosolids on their land, through the democratic process, were able to have their concerns met and their property rights protected respectively.

CHAPTER 3

Theoretical Considerations

The purpose of this chapter is to examine selected relevant political theories that explain how the formation of a grassroots environmental group in the Palo Verde Valley had its concerns registered in the political arena. Their actions resulted in an ordinance which, for the most part, has addressed many of the problems associated with the application of sludge to agricultural land.

Jones has identified a number of "functional activities" associated with getting problems to government.[1] These functional activities will provide the general framework for analyzing the specific events that occurred in eastern Riverside County that led to the adoption of Ordinance 696. Reference to other public policy theoreticians also will enhance the framework for analysis of this case study.

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[1] Charles O. Jones, *An Introduction to the Study of Public Policy*, 2nd Edition (North Scituate, MA: Duxbury Press, 1977) 26.

Jones states that, ". . . problems influence the processes designed to solve them, the processes in turn help to explain programs and policies, and policies effect which problems emerge in society and get to the agenda of government."[2] Democracy is a theory of influence.[3] The problems that arise in our society are brought forth to the government arena where they are addressed or excluded by the political system.

A Systems Analysis Approach To Provide The "Big Picture"

Before examining the functional activities that led to the adoption of Ordinance 696 an overview of David Easton's comprehensive "Dynamic Response" Model will provide a macroscopic view of a political system in its environment (Figure 3-1).

The environment surrounding a political system provides a wellspring of political inputs. These inputs may be ecological, biological, personality, or from social

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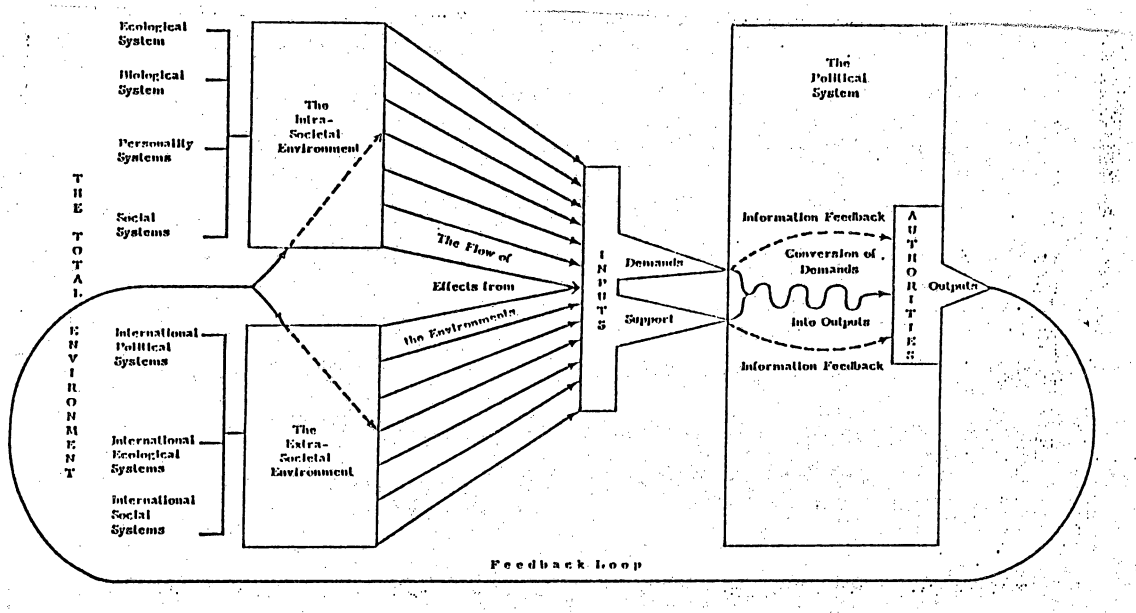
[2] Jones, page 6

[3] Sheldon Kamieniecki, Robert M. O'Brien, and Michael Clarke, *Controversies in Environmental Policy*, (Albany, NY: State University of New York Press, 1986) 253.

Figure 3-1



David Easton's "Dynamic Response" Model of a Political System. From a Framework for Political Analysis (Englewood Cliffs, NJ: Prentice-Hall, 1965) p. 110

systems. There are two kinds of inputs entering the political system from its environment: demands and supports.[4] *Demands* are disturbances such as civil disobedience, natural disasters, and citizens petitioning the government to act on a problem with the intent to cause change. *Supports* include actions such as paying taxes, obeying the law, and voting. The political system may or may not opt to respond to these inputs with outputs that affect changes in the environment. The outputs often take the form of policy decisions. These policy decisions then themselves exert a change on the environment.[5] The environment then responds or reacts to the output from the political system thus forming a feedback loop back into the political system.

If the demands on the political system are sufficiently intense the political system must respond. Easton defines the political system as those identifiable

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[4] David Easton, *A Framework for Political Analysis*, (Englewood Cliffs, NJ: Prentice-Hall, Inc. 1965) 108-109.

[5] James E. Anderson, *Public Policy-Making*, 2nd Edition, (New York: Holt, Rinehart, and Winston, 1979) 17.

and interrelated institutions and activities in a society that make authoritative decisions. Easton's systems theory provides an overview as to how inputs effect the political system but is limited in explaining how new policies or policy changes occur. The political system in this model appears as a mysterious "black box" that somehow converts stresses into outputs. Systems theory provides some help though by creating an overall model of policy formation while alerting us to some significant aspects of the political process.[6]

In this case study, a loose band of citizens and farmers protested the lawful land application of sludge on agricultural land near their community. Citizen activists were not the only source of inputs to the political system. The total environment also includes the companies that transport sludge, the POTWs that generate the sludge, the farmers that want to use sludge on their land, the news media and the local water district.

[6] Easton, 109, 111.

Farmers that utilized swore by its efficacy. "Sludge is one of the best things that happened in this Valley for many years," exclaimed Louis Schindler of Schindler Brothers farms. He added that some of his poorest lands are now producing alfalfa, oats, rye grass, and cotton after biosolids applications.[7]

Bart Fisher, a farmer opposed to sludge use declared, "I would never expose my family, myself, my employees, nor my machinery to sludge."

The political entities involved in this case were the City of Blythe, the Palo Verde Irrigation District (PVID), the California Regional Water Quality control Board - Colorado River Basin (Region 7), and various agencies and departments of the County of Riverside. All these agencies were jolted by the public's clamor about the foul odors and flies, and fears about surface and ground water contamination. The federal government and the state already had policies to address the land application of sludge yet these alone could not satisfy the people's

[7] Jeannette Hyduke, "Farm Use of Sludge Debated" *The Riverside County Press Enterprise*, 14 February 1990, B-1.

mandate. The higher levels of government could not react quickly enough leaving the resolution of this matter to Riverside County.

The County's decision to regulate the beneficial reuse of sludge has affected the political environment. Companies seeking to provide biosolids to farmers face a rigorous permitting process exceeding that of the State and, in many cases, other counties. In recent years sludge applicators have sought permits to spread biosolids on agricultural land only to be frustrated by the arduous requirements which include: compliance with the California Environmental Quality Act, submission of a general sludge management plan, site specific application plans and fees. Only two companies have obtained permits since the passage of 696.

The Policy Process Approach

The political system cannot be adequately studied apart from its environment.[8] Since the political system may be conceived of as separate from and acted upon by its

[8] Anderson, 27.

environment the focus now shifts to the process by which a public problem becomes a public policy or how the political system produces outputs.

Jones' approach to studying policy development involves selecting a problem and permitting it to go where it will rather than looking at how a given institution tackles a given problem. Often the players involved in acting on a problem are drawn from various institutions, rather than just one agency. Jones calls this the "Policy Process" approach.[9]

Jones has divided his methodology for analysis of public policy into a sequence of functional activities:[10]

Perception

Definition

Aggregation

Organization

Representation

Formulation

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[9] Jones, 3.

[10] Ibid., 9.

Legitimization

Appropriation

Implementation

Evaluation/Appraisal

Resolution/Termination

The first four of these classifications will provide the theoretical pegs for analyzing how the citizens of the Palo Verde Valley were able to get their problem to government. It is not within the scope of this project to study the role of the Board of Supervisors or their role in formulating and legitimizing the ordinance. Instead the focus will be on how grassroots activists brought their perception of a public problem and defined it to be addressed by government.

The perception, definition, aggregation and organization functional activities provide the framework for analysis of the policy-making process. What occurs within these stages is dependent upon the political climate of the time in which the policy enactment is considered. Results vary considerably from one piece of legislation to

another, even when the same issues are considered.[11] The reaction of the local political system to the inputs from the Palo Verde Valley happened at one place in time. The first four of the above steps leading to the enactment of Ordinance 696 will provide the basis of the analysis. The interjection of additional theoretical considerations will provide insight into the discussion of each of the steps.

Perception and Definition of the Problem

How issues are perceived determines if they are serious enough to warrant governmental attention. The perception and definition of a problem condition whether the problem is public or private in nature.[12]

Anderson states that a policy problem can be defined as a condition or situation that produces needs or dissatisfactions on the part of people for which relief is sought. The point to be made here is that there are all kinds of needs and problems, but only those that move

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[11] Kent E. Portney, *Controversial Issues in Environmental Policy: Science vs. Economics vs. Politics*, (Newbury Park, CA: Sage Publications, 1992) 36.

[12] Jones, 27.

people to collective action become public problems.[13] When a group of people perceive a problem and articulate the issue and are willing to bring it before their representatives can it truly be called a public problem. Dewey further elaborates that issues are public when an event or series of events affects a community and its response is to, ". . . have those consequences systematically cared for."[14]

Jones defines the problem identification process in a democratic society as being "subjective". These processes place a great deal of reliance on how those effected by an event interpret their needs.[15] Yet objective considerations are also necessary in problem identification. Scientific measures may be employed to define problems.[16]

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[13] Anderson, 52-53.

[14] John Dewey, *The Public and its Problems*, (Denver: Alan Swallow, 1927) 12.

[15] Jones, 17

[16] Jones, 18.

It is easy to understand how both increased scientific objective data and subjective reactions to environmental events have led to the public's heightened awareness of environmental issues. The public is more conscious of the possible consequences of environmental threats, whether real or imaginary. When a series of events affects a community the response is initially one of ". . . alarmed discovery and euphoric enthusiasm" resulting in demands placed on the political system to "do something"![17]

A public problem is defined as ". . . a human need for which relief is sought."[18] An individual's perception of an event - whether accurate or not - that is injected into the policy making arena often contributes to the definition of the problem. Webster's New Collegiate Dictionary defines "definition" as the "act or power of making definite and clear or of bringing into sharp relief". The problem in Palo Verde Valley was defined by the actions of the agencies, organizations, and individuals referenced in

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[17] A. Downs, "Up and Down with Ecology: The Issue Attention Cycle" *The Public Interest*, (2,1972) 38.

[18] Jones, 27.

the following paragraphs. The policy actors of the State and local developed their own perceptions as well. There was a need to gain a stronger grip on the issues in order to respond to the public demands and have an effective means of responding to the public complaints. Even though the applicator at the center of the controversy was complying with existing statutes and regulations, more effective action was needed to address the concerns. It became clear that the necessary action was to have the County develop a policy, and hence, an ordinance to control the land application of sludge.

How the Problem of the Land Application of Sludge was Perceived and Defined

The public's outcry against the land application of sewage sludge was rooted in the regional residuals management infrastructure. Sludge is generated from processing domestic and industrial sewage at Publicly (or privately) Owned Treatment Works (POTWs). The creation and management of biosolids resulting from this process is

clearly a public problem that needs to be addressed in a manner consistent with the public interest.[19]

Entrepreneurs found a problem in search of a solution. The generation of biosolids did not stop just because POTWs could no longer dump it into the sea. These displaced residuals found their way to the land by enterprising companies. Bio-Gro Systems, Inc. found that the Region 7 Water Quality Control Board would issue waste discharge requirements for the disposal of sludge on arid farm land in eastern Riverside County. Federal regulation of sewage sludge was insignificant and land spreading could occur with minimal government oversight.[20] The public demanded greater accountability for sludge applicators and the need for a watchdog to oversee these activities.

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[19] The Ocean Dumping Ban Act of 1988 solved the problem of marine pollution resulting from the deep sea disposal of sludge but created a dilemma of where this waste could be discharged: solving one public policy problem resulted in another.

[20] Bio-Gro implemented their own testing of sludge, soils, tailwater (run off from crop irrigation), and plant tissues even without regulatory requirements.

Aggregation of State and Local Governments

The public went apoplectic when they realized that their community was a "dumping ground" for "L.A.'s sludge." Their comfort zone had been violated. They were not impressed by the claims sludge applicators that the residues were safe for agricultural use. John M. Fanning, Environmental Health Director, explained that the problem was not so much the use of sludge on agricultural land but rather that the material came from Los Angeles POTWs. The perception was that sludge from L.A.'s industrial communities was contaminated with pollutants that were far worse than sludge from local sources. There was no assurance as to it's suitability for agricultural use.[21]

William Martindale, mayor of Blythe reported to County Environmental Health officials that he had received 80-100 calls from citizens and that several people at the Mesa Bluff Mobilehome Park and Golf Course had to be treated with oxygen due to the foul odors. (This statement could

[21] Personal interview with John M. Fanning on January 30, 1996. Fanning is the top administrator for Environmental Health and was instrumental in the development of 696.

not be proven by City officials and the list of complainants was not provided to County investigators.)[22]

Dave Marlow, who farms 1,600 acres, had not applied sludge to his land but adjoins a farm that had. He complained that he could accrue liability if wind-blown sludge or contaminated run-off came in contact with his property. He demanded that the County issue a cease and desist order to stop Bio-Gro from violating Region 7's requirements. (The Environmental Health Department had no authority to issue an order for violating Region 7's requirements nor could County officials detect objectionable odors or mismanagement of sludge.)[23]

The Palo Verde Irrigation District (PVID), a local entity providing water to farms and residents in the area, queried Region 7 about the contamination of surface waters and ground water from the mismanagement of sludge by applicators within their district boundaries. Region 7's

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[22] Laurie Holk, County of Riverside, Department of Environmental Health, Complaint Report, December 1, 1989, Attachment I, page 1.

[23] Ibid.

letter stated that the Order permitting the land application of sludge also prohibits the discharge of tail water but that they did not have the staff resources to monitor for violations of this prohibition; they asked the PVID's staff to conduct surveillance of the fields where sludge had been applied and report any tail water discharges.[24] Region 7 also said that they could not adopt permits to regulate individual landowners where sludge had been applied. Phil Gruenberg, Executive Officer, concluded this letter by recommending that Region 7 regulate only tail water discharge while "others" should regulate public health concerns such as odors, nuisance, impacts on cropland productivity, and that the primary permitting authority should be Riverside County.[25]

Aggregation and Organization of Grassroots Power

The buck-passing and governmental inaction became too much for Jerome and Barbara Colerus who resided near a

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[24] Tail Water means the excess water applied to a field that does not infiltrate the soil, but collects at the lower end of a field.

[25] Phil Gruenberg, letter dated, January 9, 1990.

sludge application site. On February 2, 1990 they attempted to block Bio-Gro trucks from entering a field on Highway 78 between 32nd and 34th Streets. The protesters confronted Bio-Gro staff and eventually Bio-Gro agreed not to apply sludge in fields near the Colerus' home. (Region 7 and County officials found that Bio-Gro had been applying sludge in accordance with the Waste Discharge Requirements.) The Colerus' continued to carry placards protesting land application of sludge for another week, insisting that the practice was an odor nuisance and a threat to the numerous domestic wells in the area. Officials from both agencies agreed that it was time to develop an ordinance to more closely regulate this activity. The Colerus' efforts became the focal point for the aggregation of public opinion. Obviously, significant "inputs" for policy change were being implemented.

The efforts of Mr. and Mrs. Colerus were not haphazard.

To organize the upwelling of grassroots power they developed a "Three Part Plan" to rid the Palo Verde Valley of the "disgusting, putrid, and unhealthy practice of

bringing sewage sludge into the Valley . . . under the guise of calling it a fertilizer application."[26] The first phase of their plan was to block the entrance to the fields to prevent sludge transporting trucks from entering or leaving the fields. The second phase was to picket the fields. The third phase was to circulate a petition to secure at least 5,000 signatures to present to the powers that be to stop the import of sludge to the Palo Verde Valley.[27]

On February 22, 1990 Jerome Colerus attended a meeting held at Riverside County Supervisor Patricia "Corky" Larson's office in Indio. Others in attendance included Dr. James Gallagher, Riverside County Public Health Director and representatives from the Palo Verde Irrigation District and Bio-Gro. Mr. Colerus stated that his concerns were the source of the sludge, odors, spillage of sludge on the highway, and possible contamination of his shallow well in the vicinity of the land applied sludge. He also

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[26] Jerry Colerus quoted by Kathy Hyduke-Spraggins, "News Items" *Palo Verde Times*, 14 February 1990.

[27] Ibid.

presented his petition of 400 signatures that he had collected supporting the position to stop the land application of sludge in the Palo Verde Valley.[28]

Gerald Davisson of the PVID represented farming interests and expressed water quality concerns which included:[29]

- the quality of runoff that returned to the Colorado River from tail water drains,
- testing of shallow residential wells,
- the questionable insurability and liability of fields where sludge had been applied,
- the uncertain location of all the fields in the region which had received sludge; and
- the inability of Region 7 to monitor all the parameters that concerned public health and nuisances.

Carol Pavon and Johnny Johnson of Bio-Gro responded by saying that they had already discontinued the practice of

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[28] Laurie Holk, Memo to John M. Fanning, Environmental Health Director, "Palo Verde Sludge Disposal Meeting, Supervisor Larson's Office [on] February 22, 1990", February 23, 1990.

[29] Ibid.

applying sludge adjacent to tail water drains, that they would provide a map showing all the fields where sludge had been applied, and that they would cooperate fully with local health officials to address the public's concerns since any pollution caused by their company would put them out of business.[30]

Supervisor Larson asked Dr. Gallagher if he felt that there was a need for a County ordinance to address the concerns expressed during the meeting. He agreed with Supervisor Larson that an ordinance was needed.[31]

Discussion

The interests of ordinary citizens, farmers, water purveyors, government officials, and sludge applicators resulted an organized aggregate of public interest that brought their perceived problem to government for decisive action. The difficulty that Region 7 and Riverside County had in addressing the issue exposed a weak link in the ability of the political system to adequately regulate

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[30] Ibid.

[31] In the policy formation process, the input of "experts" such as scientists and physicians carries extra weight.

sludge. The participation of the effected public, State and local agencies all contributed to the adoption of Ordinance 696.

Not all interested parties were against the use of sludge on agricultural land. Pressure to allow the use of sludge as a fertilizer was exerted by some members of the farming community. Obviously, those in the sludge application business were also stakeholders.

Truman conceptualized the governmental process as a mosaic of interacting groups both in and out of government. Truman identified the efforts of groups to solve their problems as an inevitable "gravitation towards government."[32] He describes the dialectic among interest groups:

> Just as the direct and indirect effects of an interest group may disturb the equilibriums of related groups, so its operations through and upon government are likely to force related groups to assert their claims upon governmental institutions in order to achieve some measure of adjustment.[33]

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[32] Jones, 34.

[33] David B. Truman, *The Governmental Process*, (New York: Knopf, 1951) 113.

Jones asserts that "many of the problems that eventually get to government were first created by the implementation of policy. That is, government caused the event perceived and defined as a problem for an individual or group."[34] The EPA's ban on ocean dumping may have solved one problem -- pollution at sea from the discharge of sludge -- but this action resulted in another problem. The inability of Region 7 and Riverside County to address the problem under the existing rules and regulations caused both agencies to take action and recommend a new rule at the local level to address the public's concerns.

Dahl aptly summarized the interaction of stakeholders described in this chapter:

> A central guiding thread to American constitutional development has been the evolution of a political system in which all the active and legitimate groups in a population can make themselves heard at some crucial stage in the process of decision.[35]

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[34] Jones, 27.

[35] Robert A. Dahl, *A Preface to Democratic Theory*, (Chicago: University of Chicago Press, 1956) 137.

CHAPTER 4

Why Conduct a Survey?

At the beginning of this Graduate Research Project two questions were asked. The first question was:

- How did the citizen activists of the Palo Verde Valley force the County of Riverside to regulate the land application of sludge?

The second question:

- How do other jurisdictions implement their sludge management programs? What activities do they conduct to implement the rules governing this endeavor?

Adjunct to this questions is the matter of whether State or local agencies should have primary authority over this issue:

- Should State or local agencies implement the oversight of sludge reuse projects?

The answers to these questions will help to determine what constitutes an effective biosolids recycling program at the local level and provide insight into suggested revisions to Ordinance 696.

Political officials acquire the authority to settle political questions through the electoral and policy making process. However, bureaucrats, because of their technical expertise are delegated authority to settle administrative questions.[1] By surveying Environmental Health Directors-technical experts in implementing such regulatory programs-one should be able to determine what an effective sludge regulation program looks like and how to make improvements to Ordinance 696.

Theoretical Basis for the Survey

The theory driving this survey is David Easton's Dynamic Response Model discussed in Chapter 3. The purpose of conducting this survey was to determine whether other counties have experienced public pressure to regulate sludge and whether such pressure resulted in an ordinance or some other mechanism to administer this activity. The survey also seeks to discover the policy outputs produced by other jurisdictions. Easton's systems theory models

[1] John T. Sholz and Feng Heng Wei, "Regulatory Enforcement in a Federalist System", *American Political Science Review*, (80(4) December 1986) 1249.

what has occurred in Riverside County and by other jurisdictions in California.

Questionnaire Instructions and Format

The classification of research used in this report is descriptive. The survey's purpose is to determine if public input has influenced the regulation of the land application of sludge in other jurisdictions-from the perspective of local Environmental Health Directors-and whether or not other counties or cities are engaged in regulating this activity, how they are administering their programs, and which level of government-State or local-should oversee sludge reuse programs.

The questionnaire was accompanied by a cover letter introducing the respondent to the survey (Appendix D). The survey, which includes instructions for its proper completion, consisted of a series of seventeen closed-ended questions some which are based on the Likert Scale to determine the intensity of interest the participants have toward the issues presented, while other questions request

straight-forward objective answers (Appendix D).[2] A contingency question separating participants on the basis of whether or not they have a sludge ordinance was included to detour respondents from questions that may not be applicable to their circumstances. Those with a sludge ordinance answered a series of specific questions about how their programs are implemented. The final questions of the survey, to be answered by all the participants, assessed attitudes toward the appropriate political system-State or Local-that should have primary authority over the management of sludge land application programs. The participants are also asked to gauge the adequacy of their jurisdiction's program.

A total of 53 (n=53) Local Environmental Health Directors were selected to receive the questionnaire because of their knowledge of local programs regulating the land application of sludge and public health issues in general (Appendix C). Forty-nine of the recipients were

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[2] Earl Babbie, *The Practice of Social Research*, 6th Edition, (Belmont, CA: Wadsworth Publishing Company, 1989) 180-181.

top administrators of county based agencies while four were employed by cities.

Self-addressed stamped return envelopes were included with the cover letters and questionnaires to facilitate a response from the Directors. The surveys contained just seventeen questions to ease the burden on participants who maintain busy schedules. It was anticipated that the recipients would delegate answering the survey to a staff member with the most expertise in the sludge reuse program.

Some of the caveats expected from sending the questionnaires to Directors were that they would not take the time to respond to the survey due to their busy schedules. Thus the response rate could have been low. Another problem might have been that if their jurisdiction did not have an ordinance governing sludge reuse they may not care to make that information known by exposing an "inadequacy" in their program. Also, a Director of a county with a biosolids land application program might not have wanted to have his or her program compared to other jurisdictions and be shown to be deficient in some way. To avoid some of these potential pitfalls the cover letter

stated that the survey results used in this Graduate Research Project would not identify counties or cities by name thus providing a measure of anonymity to encourage a higher response rate. Some participants volunteered the name of their jurisdiction and even included cover letters explaining some of their answers to the questions. Others chose to remain anonymous.

The response rate is an important factor to reduce the chance of a response bias. Babbie provides a rule of thumb regarding response rates. A rate of 50% is deemed adequate for analysis and reporting. A response rate of at least 60% is good while 70% is considered very good.[3] The response rate for this survey was 77%. Out of the fifty-three surveys that were mailed forty-one were returned. Personal conversations with counterparts in other Counties about the survey's topic indicate a lot of concern and interest regarding this subject, especially in Counties where agricultural is a major business interest (i.e., Fresno County, Kern County, etc.). Out of the fifty-three

[3] Ibid., 267.

surveys that were mailed forty-one were returned. Also having the self-addressed, stamped return envelope, the clear explanation of the purpose of the survey, the cover letter using the letterhead of the Riverside County Department of Environmental Health gave the survey documents a professional appearance that encouraged the high level of response. Finally, the questions were designed to be easy to answer considering the respondent's time constraints.

Survey Questions and Analysis of Results

Following are the questions mailed to the Environmental Health Directors and a discussion of the hypothetical basis of each question. Also presented is a tabulation of the responses to each question followed by a discussion of the results as they relate to the question's hypothesis. (See Appendix D for the actual survey instrument that was mailed to the respondents.)

Question 1 -- Which of the following general categories best describes the setting of your County or City? (Select only one answer)

- ☐ Urban/Industrial
- ☐ Urban/Suburban
- ☐ Suburban/Rural
- ☐ Rural/Agricultural
- ☐ None of the above

This question provides the contextual setting for each responding jurisdiction. It is important to understand the overall setting of a jurisdiction when judging responses to questions relating to the land use of biosolids. The usefulness of the data obtained from this question will be further explained in discussions of the following questions.

The goal of this question is to isolate a characteristic of the environment which is germane to the topic of the landspreading of sludge as a soil amendment. Easton describes the total environment as the source of inputs into the political system.[4] Each county or city is a distinct political system which is separate from its environment and the sources of stresses that are placed on the political system.

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[4] David Easton, A Framework for Political Analysis, (Engelwood Cliffs, NJ: Prentice-Hall, Inc. 1965) 59.

Hypothesis: *The majority of responding jurisdictions will identify their surrounding environment as being Suburban/Rural or Rural/Agricultural.*

Table 4-1

Environmental Setting	#	%
Rural/Agricultural	20	49
Suburban/Rural	13	32
Urban/Industrial	5	12
Urban/Suburban	3	7

Eighty-one percent of the respondents described their jurisdictions as being in either rural/agricultural or suburban/rural. It is logical that the land application of sludge would occur mainly in rural communities. Many counties in California have agricultural activity. The significance of this hypothesis and the response to this question are further analyzed in the discussion of questions 3 and 4.

Question 2 -- The beneficial reuse of sewage sludge is used primarily for the following purposes in your City or County? (Select only one answer)

☐ Agricultural soil amendment or fertilizer

- ☐ Land reclamation soil amendment
- ☐ None of the above

It is possible that an urban community would regulate sludge as a part of a land reclamation project rather than an agricultural soil amendment. The purpose of this question is to determine whether or not sludge is used in the jurisdiction and if so, for what purpose. This question attempts to further describe the environmental setting of the political system: If sludge is used in a jurisdiction it is just one of the many sources of inputs and stresses on the system; an element of the environment the survey is attempting to isolate for relevance to this project.

Hypothesis: *In jurisdictions where the land application of sludge occurs it is utilized as a agricultural soil amendment rather than a land reclamation soil amendment.*

Table 4-2

Beneficial Reuse Applications	%
Agricultural Soil Amendment or Fertilizer	51
Land Reclamation Soil Amendment	2
None of the above	41
No Response to this question	4
Some form of Beneficial Reuse	74

A narrow majority of 51% stated that sludge was used as an agricultural amendment in their jurisdiction.

About 20% of the respondents answering "none of the above" to Question 2 also indicated by their responses to other questions that sludge was actually used within their jurisdiction (i.e., they stated that they regulated sludge in some manner or the public had concerns about the use of sludge in their jurisdiction). Actually sludge was beneficially reused in the jurisdictions of about 74% of the respondents.

To elicit a clearer response to this question it should have offered an answer such as, "Sludge is not beneficially reused at all in my jurisdiction". It seems as though there may have been some confusion as to how to answer this question (4% of the respondents did not answer the question at all).

Question 3 -- Has your agency received inquiries or complaints from the public reporting nuisances or health concerns regarding the practice of using sludge as a soil amendment?

☐ Yes, a lot of complaints and/or inquiries (about one per month or more)

- ☐ Occasionally (about five to ten complaints and/or inquiries per year)
- ☐ Rarely (between one to five complaints and/or inquiries per year)
- ☐ None

The purpose of this question was to obtain information about public input to the local government agency regarding sludge use. The terms "inquiries" and "complaints" imply a low to moderate level of public input such as a phone call to an agency about nuisances in the vicinity of their home or business. This level of interaction between the environment and the political system would not, on its own, be expected to place an adequate stress on the political system to cause a change in public policy.[5]

Hypothesis: *The majority of respondents will occasionally receive complaints about the land application of sludge*.

Table 4-3

Complaints/Inquiries	%
A lot; ≥ one per month	2
Occasionally; 5-10 per year	12
Rarely; 1-5 per year	32
None	51
No response	4

[5] Easton, 107.

Fifty-one percent of the responding jurisdictions stated that they had not received complaints or inquiries about sludge use in their jurisdiction. Conversely, 46% had at least rarely, or more often, receive complaints or inquiries from the public. The responses to this question were compared by environmental setting to provide greater understanding of the their significance.

Table 4-4

Rural/Agricultural Settings	**%**
Complaints/Inquiries	
A lot; ≥ one per month	5
Occasionally; 5-10 per year	10
Rarely, 1-5 per year	35
None	45

Table 4-5

Suburban/Rural Settings	**%**
Complaints/Inquiries	
A lot; ≥ one per month	0
Occasionally; 5-10 per year	23
Rarely; 1-5 per year	23
None	54

The respondents identifying themselves as Rural/Agricultural and Suburban/Rural received the highest number of complaints and inquiries from the public and were

most impacted by complaints from the public. Fifty-five percent of the Rural/Agricultural jurisdictions said that complaints and inquiries were registered from the public but only 5% of these said they had received more than one complaint or inquiry per month. The majority of Suburban/Rural jurisdictions said that that never received complaints but a significant 46% indicated that they occasionally or rarely received complaints. This implies that the land application of sludge is a concern, though perhaps not a major one, to the public in rural areas. As bedroom communities continue to expand into agricultural areas it is likely that the level of public awareness and concern about the landspreading of sludge is likely to increase. This emphasizes the need for greater regulation of this activity in the future.

Question 4 -- Have concerned citizens or an organized environmental group demanded that your agency take action to control or prohibit the land application of sewage sludge in your jurisdiction?

☐ Yes, there has been a significant demand from the public for local regulation of the land application of sludge.

- ☐ There has been <u>some</u> demand from the public for local regulation of the land application of sludge, but not a great deal.
- ☐ There has not been an organized effort to demand local government to regulate the land application of sludge.

This question is concerned with a higher level of organized opposition to the use of sludge as a soil amendment than complaints registered by individual citizens. Has serious public input been placed on the political system and its agencies to get this issue into the public policy arena?[6] The existence and influence of pressure groups can never be overlooked but their influence should not be overstated. The needs, worries and opinions of these stakeholders should be recognized as having an important role in shaping public policy.[7]

Hypothesis: *A majority of respondents will state that there has been some grassroots activism in their jurisdiction to have local government regulate this activity.*

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[6] Ibid., 130, 131

[7] Crawford Morgan, "Asbestos Policy and Implementation in Public Policy Practice in a Local Authority", ed. Talib Younis, *Implementation in Public Policy* (Brookfield, VT: Gower Publishing Company, 1990) 40.

Table 4-6

Level of Citizen Activism	%
Significant	22
Some	20
None	58

Organized efforts have not played a major role statewide in pressuring local governments to control or prohibit the land use of sludge. The discussion of questions 5 and 6 will provide further analysis regarding the significance of grassroots efforts. Grassroots activism has occurred to a degree and has played a role in jurisdictions that have adopted local ordinances (see question 6 below). The issue of the land application of sludge has not been a major concern statewide.

Question 5 -- Has the local governing body (Board of Supervisors or City Council) adopted an ordinance to regulate the land application of sewage sludge?

☐ Yes (if you answered "Yes" please respond to all of the remaining questions in this questionnaire)

☐ No (if you answered "No" please skip questions #6 through #14 [Section 2] and commence answering questions #15 through #17 [Section 3])

This question has departed from the Likert Scale format to obtain empirical data about the existence of a local ordinance. The survey, at this point, begins to explore outputs from the political system. A positive answer will lead the respondent through a series of questions about their ordinance and how it is implemented. Those that provided a negative response skipped these questions to rejoin the other respondents at question 15 to express their opinions about the appropriate level of government to implement administration over the land application of sludge.

Hypothesis: *The majority of cities and counties responding to this questionnaire will state that they have <u>not</u> adopted an ordinance to regulate the land application of sewage sludge in their jurisdiction.*

Table 4-7

Local Ordinance Adopted?	%	%
Yes	20	24
No	80	76

Twenty percent indicated that they had adopted an ordinance to regulate the land use of sludge. However, an additional 4% volunteered that they regulated sludge by a means other than a local ordinance. The regulation of sludge occurred in some jurisdictions through Conditional Use Permits or through issuing "exemptions" from State Solid Waste Facilities Permits.[8] Seventy-six percent of the responding jurisdictions chose-whether by intention or default-to allow the State to regulate the land application of sludge within their jurisdiction. Many small counties lack the funding to conduct their own programs to regulate sludge. It is also possible that some counties feel that having the State and county regulate the same activity is a duplication of efforts and therefore not an efficient use

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[8] Title 14, California Code of Regulations provides a mechanism for counties to regulate the disposal of sludge to agricultural land through an administrative process whereby a farmer designates his or her property as a solid waste disposal site. That is if sludge is <u>disposed</u> (i.e. final deposit) of rather than applied at an agronomic rate. This creates an argument of semantics whether or not land application is a disposal practice or the beneficial reuse of a waste product. Ordinance 696 views the land application of sludge, when applied at an agronomic rate, beneficial to crops rather than a disposal practice.

of resources. Different State Regional Water Boards may also take a more active effort in regulating the land application of sludge and provide satisfactory service to the concerned public.

Some respondents however, indicated that they desired to have their jurisdictions adopt an ordinance for local control but it was not politically expedient.

Question 6 -- Was the local ordinance for regulating the land application of sewage sludge in your jurisdiction adopted in any way as a result of grassroots political pressure placed on the local governing body?

☐ Yes
☐ No
☐ Not Sure

Has there been anyplace besides Riverside County where grassroots political pressure forced local government to adopt an ordinance to govern the land application of sewage sludge? Have demands been placed on the political system sufficient to cause a disturbance to the system? Have the demands resulted in a change in the existent pattern of operation?[9]

[9] Easton, 91.

Hypothesis: *The majority of jurisdictions that have adopted a sludge regulation ordinance have done so as a result of political pressure.*

Table 4-8

Grass Roots Pressure to Adopt Ordinance?	%
Yes	56
No	44
Not Sure	0

The response to this question supports the hypothesis that most counties and cities regulating the land application of sludge have done so as a result of political pressure. Yet a significant segment (44%) state that grassroots pressure had not caused their jurisdiction to formulate a policy output on this topic. The implication is that the ordinance came about by some other means. Some jurisdiction may have been more proactive in addressing the issues surrounding land application and did not wait for political pressure to force them to act. Also political pressure could have come from other sources, such as sewage treatment plants looking for a legitimate outlet for their

residues or from concerned farmers wanting to see this alternative soil amendment utilized in a controlled manner.

Question 7 -- Does your local ordinance have a provision whereby your agency issues permits to allow for the land application of sewage sludge by an approved, qualified operator?

☐ Yes
☐ No

A permit is a basic regulatory tool that provides a measure of control over who gets to apply sludge to agricultural land and who does not. The smaller and more definable the target population whose behavior needs to be regulated by a policy(i.e. that come under the authority of a permit or license), the more likely the policy will be successfully implemented.[10] There are only a handful of companies engaged in the land application of sludge and they are relatively easy to identify from the population as a whole.

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[10] Daniel A. Mazmanian and Paul A. Sabatier, *Implementation and Public Policy*, (Palo Alto, CA: Scott, Foresemen and Company, 1983) 24.

Hypothesis: *Most agencies that have an ordinance to regulate sludge have a mechanism for issuing permits to persons with adequate qualifications.*

Table 4-9

Permits issued to qualified Applicator?	%
Yes	80
No	20
Not Sure	0

The survey confirmed the hypothesis. Eighty percent of the jurisdictions participating in the survey issue permits to qualified operators. Permits provide a mechanism that requiring persons or corporations to behave in a manner contrary to their self interest or run the risk of being punished.[11]

Question 8 -- Which of the following parties are required to obtain a permit under your jurisdiction's ordinance? (select any that apply):

- ☐ Sewage sludge transporters
- ☐ Sewage sludge applicators

[11] Clifford Russell, Winston Harrington and William J. Vaugn, *Pollution Laws*, (Washington, D.C: Resources for the Future, 1986) 1.

- ☐ Land owners (i.e., farmers or land reclamation project owners)
- ☐ None of the above
- ☐ Other

The above parties are among those that may be required to obtain a permit under a local ordinance. Often farmers will be reluctant to obtain a permit if it means that her or his land will be considered a solid waste disposal site. This question is also of interest because permits can provide a source of revenue to finance the administration and implementation of a sludge regulation program. (There is further discussion on financing in question 14.)

Hypothesis: *Most jurisdictions will report that they issue a permit to one or more of the above parties.*

Table 4-10

Permit Required?	%
Sewage Sludge Transporters	33
Sewage Sludge Applicators	89
Land Owners	44
None of the above	0
Other	0

The survey confirmed the hypothesis. The most commonly permitted stakeholder in the land application arena is the applicator. Normally applicators are responsible for getting the sludge from the sewage

treatment plant to the land where it is applied. Next to land owners, these participants are the most easily identified and controlled.

Question 9 -- Does your agency conduct inspections of sludge transportation vehicles?

☐ Yes
☐ No

The condition and maintenance of vehicles transporting sludge is important to assure that vehicles do not leak sludge along transportation routes.

Hypothesis: *The survey will indicate that it is common practice for an ordinance to require the inspection of sludge transportation vehicles.*

Table 4-11

Inspection of Sewage Sludge Transportation Vehicles?	%
Yes	56
No	33
Not Applicable	11

The survey confirmed the hypothesis. Contamination of roadways with sludge or liquids leaking from sludge vehicles is potential health threat and most jurisdictions recognize the necessity of regulating this activity.

Question 10 -- Does your agency periodically sample sludge that is delivered to land application sites to assure that levels of heavy metals are below regulatory thresholds?

☐ Yes
☐ No

This question is important to lend credibility to a program regulating the land application of sludge. The public has more confidence in a program when the regulators can demonstrate through first hand verification that the sludge applied to agricultural land meets the Part 503 standards rather than depending solely upon the applicator and the Publicly or Privately Owned Treatment Works (POTW) to provide compliance data. It is impossible to confirm compliance without on-going monitoring.[12] It is necessary to determine on a continual basis the levels of pollutants that accumulate in the soil in order to verify the efficacy of a monitoring program.

Hypothesis: *Due to the expense of laboratory tests it is unlikely that most local jurisdictions can afford, and*

[12] Russell, 4.

therefore do not practice, the periodic testing of sludge that is applied to fields.

Table 4-12

Sampling of Sewage Sludge?	%
Yes	66
No	22
Not Applicable	11

Contrary to the prediction of the hypothesis, two thirds of the respondents indicated that they periodically take sludge samples for laboratory analysis. This is encouraging from an environmental protection standpoint because sludge testing affirms that it is free from harmful levels of toxic elements.

Question 11 -- Does your agency periodically take soil samples from fields before sludge is applied to verify whether it has exceeded the cumulative loading rates and/or annual loading rates for heavy metals?

☐ Yes
☐ No

The same credibility issue applies to this question as it does to the above question. One of the primary

environmental concerns is the accumulation of heavy metals in the soil which may threaten ground water, crops, or public health.

Hypothesis: *Few jurisdictions engage in periodic field soil testing due to the high laboratory costs.*

Table 4-13

Sampling of Field Soil?	%
Yes	56
No	33
Not Applicable	11

Again, the hypothesis underestimated the level of accountability exhibited by local environmental health departments to monitor for the accumulation of toxic elements in the soil. Some respondents indicated that soil in their jurisdiction was sampled by the Agricultural Commissioners office for the accumulation of trace elements rather than the Environmental Health Department.

Question 12 -- Does your jurisdiction's ordinance establish set back requirements limiting the placement of sludge around water wells, surface water sources, occupied dwellings, and other sensitive sites?

☐ Yes
☐ No

This criterion is important to protect water sources, as well as human and livestock exposure to pathogens, and to minimize nuisances caused by odors and flies.

Hypothesis: *It is a common practice among jurisdictions regulating sludge application to enforce set-back requirements.*

Table 4-14

Set Back Requirements?	%
Yes	89
No	11
Not Applicable	0

The survey confirms the hypothesis. Setback requirements are widely recognized methods for preventing nuisance complaints and should be an essential element of any land application program. The distances required for setbacks are often disputed by sludge application. The wider the buffer zone the larger the area where sludge cannot be applied. Sludge applicators receive get paid on the basis of the amount of sludge they apply to a field. Buffer zones can seriously limit the amount of sludge

applied. Part 503 has set back rules but the set back rules in Ordinance 696 are more strict in many cases. For example, applicators have applied pressure to reduce the 500 foot buffer zone around a water wells required by 696 to 100 feet.

Question 13 -- Does your jurisdiction's ordinance establish resting periods (i.e. site restrictions)that limit the time between the placement of sludge and the harvesting of crops which are enforced by your agency?

☐ Yes
☐ No

These criteria are important to prevent viable pathogenic organisms from coming into contact with edible portions of crops grown on sludge used as a soil amendment.

Hypothesis: *Most jurisdictions establish resting periods (i.e. site restrictions) that limit the time between the placement of sludge and the harvesting of crops or entry by the public.*

Table 4-15

Resting Period Requirements?	%
Yes	56
No	33
Not Applicable	11

The hypothesis was confirmed by the survey. Local ordinances concerned with protecting the public's health from pathogens and nuisances will establish standards regulating resting periods. A majority of respondents said that resting periods were established to protect the public from exposure to pathogens.

Farmers sometimes want to plant on a schedule differing from the established resting period. Follow-up inspections are an important implementation measure to determine compliance with this requirement.

Question 14 -- Which of the following sources provide revenue for your program to regulate the land application of sludge?(Check all that apply to your program):

- ☐ Permit processing fees for new applications
- ☐ Annual permit renewal fees for sludge applicators
- ☐ Annual permit renewal fees for sludge transporters
- ☐ Tonnage fees for sludge applied to the sites
- ☐ General Fund
- ☐ Other sources _____

Listed above are some of the typical revenue sources associated with sludge application programs. A precondition for adequate implementation of a public policy

is that it has adequate resources at each stage.[13] Question 14 queried the respondent to indicate how revenues are obtained at various phases of the implementation process.

Hypothesis: *Fees for permit processing and annual permit renewal will provide the bulk of funding for most local sludge regulation programs.*

Table 4-16

Revenue Sources	%
Permit processing fees for new applications	66
Annual permit renewal fees for sewage sludge applicators	66
Annual permit renewal fees for sewage sludge transporters	22
Tonnage fees for sewage sludge applied to the sites	22
General fund	0
None of the above	0

Most programs receive initial application as well as annual permit renewal fees from sludge applicators. This requires participants to bare the costs of implementing the program. The initial permit fees fund the start up of the sludge application monitoring program by financing permit

[13] L. Gunn, "Implementation: Problems and Approaches" ed. Younis, Ibid. 5.

application reviews. While annual renewal fees provide a source of income to support the ongoing activities for continuing compliance monitoring and laboratory testing.

A minority of respondents identified sludge transporter annual permit and tonnage fees as a revenue source. Sludge transporter fees generally support an annual inspection and fund complaint response activities from the public about nuisance vehicles. Tonnage fees are an excellent ongoing revenue source based on the actual amount of sludge applied to fields.

None of the responding parties received general fund resources to finance sludge management programs. This is indicative of the trend in government financing to have programs that generate their own income to avoid dipping into the general tax revenue pools. Self supporting programs are more likely to continue to be spared from budget cuts.

Question 15 -- State government agencies (i.e. Regional Water Quality Control Board, California Integrated Waste Management Board and/or the Department of Food and Agriculture) should have primary authority and

responsibility over regulating the land application of sewage sludge.

- ☐ Strongly agree
- ☐ Agree
- ☐ No Opinion
- ☐ Disagree
- ☐ Strongly Disagree

There have been few studies about the interactions between States with their cities and counties. There has been a trend in recent years to gradually decentralize activities once under the State's domain to the local level.[14] The fact that local governments are developing their own regulations for sludge management in their jurisdictions(at least two more counties are developing ordinances since this survey was conducted) indicates a shift of responsibility to local government.

Hypothesis: *Jurisdictions having their own sludge ordinances or possessing some other mechanism to regulate the land application of sludge locally will tend to disagree or strongly disagree with the above statement.*

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[14] Steven D. Gold and Sarah Ritchie, "State Actions Affecting Cities and Counties, 1990-1993: De Facto Federalism," *Public Budgeting and Finance* (Summer 1994) 26.

Table 4-17

State Agencies should have primary authority over regulating sludge reuse	%
Strongly agree	15
Agree	34
No Opinion	5
Disagree	32
Strongly Disagree	15

Table 4-17 shows that overall the respondents were split almost evenly regarding this issue. A very slight majority concurred with the statement. This is interesting, but to be expected, because it shows that counties are not in complete agreement over who should have primary authority. The results sorted in the Tables below support the hypothesis.

Table 4-18--State Primary Authority

Answers sorted by respondents with local sludge regulations	%
Strongly agree	0
Agree	10
No Opinion	0
Disagree	50
Strongly Disagree	40

Table 4-18, shows that jurisdictions with local regulations disagreed with the statement by a margin of

90%. Jurisdictions possessing their own rules believed they should continue to have primary authority over regulating the beneficial reuse of biosolids. It is assumed that jurisdictions with their own ordinances would want to maintain primary authority over this activity and disagree with the State taking the lead.

Table 4-19--State Primary Authority

Answers sorted by respondents without local sludge regulations	%
Strongly agree	19
Agree	42
No Opinion	6
Disagree	26
Strongly Disagree	6

In localities where communities have not taken control there was a tendency (61%) to agree or strongly agree with the statement that State government should have primary authority over land application. This implies satisfaction with the way the State is handling the program in their area. Some respondents indicated that their local environmental health programs were too small and under funded to address this issue.

Thirty-two percent of the respondents disagreed with the State having primary authority. This might indicate a

desire for greater local control or a belief that the State does not adequately address local concerns on this matter. Some respondents noted that they wanted to address the issue locally but lacked the political support to do so, even though there was some public support for such an ordinance.

Question 16 -- Local government should have primary authority and responsibility for the administration of programs regulating the land application of sludge.

- ☐ Strongly agree
- ☐ Agree
- ☐ No Opinion
- ☐ Disagree
- ☐ Strongly Disagree

Conversely to question 15, this question attempts to measure whether or not the respondent believes that local government should play a larger role than that of the State.

Hypothesis: *A majority of jurisdictions with local regulations will concur that their agencies should have primary control over regulating sludge re-use rather than State agencies.*

Table 4-20

Local Agencies should have primary authority over regulating sludge reuse	%
Strongly agree	27
Agree	34
No Opinion	7
Disagree	29
Strongly Disagree	2

The general response to this question indicates that many jurisdictions agree or strongly agree that local agencies should have primary authority over sludge reuse. When the percentages from this table are compared with the response to question 15 above it is apparent that jurisdictions might prefer a shared authority over this activity. Some jurisdictions indicated a preference for both local and state authority over this issue. In general there is a tendency for local agencies to desire control over this activity.

Table 4-21--Local Authority

Answers sorted by respondents with local sludge regulations	%
Strongly agree	70
Agree	20
No Opinion	0
Disagree	10
Strongly Disagree	0

Clearly, the results in Table 4-21 indicate that local agencies with their own rules have a strong preference for their programs over State authority.

Table 4-22--Local Authority

Answers sorted by respondents without local sludge regulations	%
Strongly agree	13
Agree	39
No Opinion	10
Disagree	35
Strongly Disagree	3

A slight majority of agencies without local regulations believe that local government should have control over regulating the land application of sludge. As indicated above, some local jurisdictions would prefer local control (based on comments included with their surveys) but it is either not fiscally or politically possible.

Question 17 -- The current level of regulation in my jurisdiction governing the land application of sewage sludge is adequate to minimize threats to public health and the environment.

- ☐ Strongly agree
- ☐ Agree
- ☐ No Opinion

☐ Disagree
☐ Strongly Disagree

The intent of this final question was to discover what percentage of Environmental Health Directors believe their programs are providing adequate protection under existing regulation.

Hypothesis: *Counties and cities will agree that the level of protection they provide is adequate regardless of whether or not they have an ordinance.*

Table 4-23

Current level of local regulation over sewage sludge reuse is adequate	**%**
Strongly agree	15
Agree	46
No Opinion	17
Disagree	17
Strongly Disagree	5

The general response expressed in Table 4-23 shows that a majority of respondents agree that their sludge regulation program (or lack thereof) provides adequate protection to the public health and environment. This can be explained by a local "home rule" ethos of antipathy towards "rule from above" (i.e., the State).

Table 4-24--Local Regulation Adequate

Answers selected by respondents with local sludge regulations	%
Strongly agree	40
Agree	50
No Opinion	0
Disagree	10
Strongly Disagree	0

The response to this question, as recorded by those jurisdiction having their own local controls over sludge reuse, is analogous with the results shown in Table 4-18. Those having local controls not only believe that their agencies should have primary authority but that they also provide adequate protection of public health and the environment.

Table 4-25--Local Regulation Adequate

Answers selected by respondents without local sludge regulations	%
Strongly agree	6
Agree	45
No Opinion	23
Disagree	19
Strongly Disagree	6

Table 4-25 indicates that 51% of the localities without a local ordinance affirm that they provide adequate

protection of public health and the environment. Either sludge recycling is not an issue among this group or State regulations provide adequate regulation of the subject activity. Still this level of confidence is not as high as expressed by jurisdictions with local policies. Twenty-five percent of the jurisdictions without an ordinance disagree or strongly disagree that adequate service was being provided, while 10% of those having such a law did not believe their local rules were adequate. Most jurisdictions were confident with their local sludge management rules: 40 % strongly agreed that they provided adequate protections while only 6% of those without local rules strongly agreed with the statement.

The responses to these questions indicate that in jurisdictions where sludge is applied to the land it was an important public issue. Without adequate rules agencies do not have the authority or the ability to provide an adequate level of protection to the public health and safety. Whether the State or local government has primary control there is no guarantee that adequate protection is provided and needs to be evaluated on its own merit.

Discussion of Results

If the citizen activists of the Palo Verde Valley can pressure local government to adopt public policy in response to their complaints then it stands to reason that that concerned citizens in other counties can achieve the same result. Grassroots activists all over California have had their concerns placed on the public agenda while some others have not.

Twenty percent of the responding jurisdictions have adopted a local ordinance while 42 % of the respondents indicate that grassroots activists have made "significant", or at least "some" demands on the political system to adopt a local rule for the land application of sludge. Not all citizen activists in the State have been as successful as those in the Palo Verde Valley at getting their agenda into the public arena.

The survey uncovered significant variation as to how local governments implemented their programs. Most Environmental Health Directors believed that their local rules provide adequate protection of public health and the environment. Most local agencies work in concert with

State Regional Water Boards to provide a full complement of protective measures.

The survey sought to discover what activities local agencies engage in to implement their local rules. The following chapter will more specifically examine Riverside County's implementation of Ordinance 696.

CHAPTER 5

The Implementation and Proposed Revision of Ordinance 696

The purpose of this chapter is to examine the Department of Environmental Health's enactment of the Board of Supervisor's mandate to regulate the application of sludge to agricultural land and to examine proposals to update the existing program. Studying implementation simultaneously causes one to look back and examine what has been done as well as to look forward to how this law could better achieve its goals of protecting the public health and the environment. Implementation theory will provide the conceptual framework to guide the analysis of how the adopted ordinance has been put into action.

Political officials, like the Riverside County Board of Supervisors acquire their authority through the electoral process. Bureaucrats, on the other hand, such as regulators in the Department of Environmental Health, are delegated authority from political officials to settle administrative questions because of their technical

expertise.[1] Most public policies are not self-executing; hence, if they are to be carried into effect, responsibility for their implementation must be assigned to the appropriate agency.[2] Considering the land application of sludge, the Board delegated structuring of this policy to Environmental Health who then drafted the ordinance for the Board's final approval on March 26, 1991.

Ordinance 696 was adopted prior to the promulgation of 40 CFR, Part 503--Standards for the Use or Disposal of Sewage Sludge. These national regulations, published in the Federal Register on February 19, 1993, were based on extensive scientific research so as to ". . . protect public health from any reasonably anticipated adverse effects of certain pollutants that may be present in sewage sludge".[3] This objective is found in section one of the proposed 696 revision (696.1) "Intents and Purposes":

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[1] John T. Scholz and Feng Heng Wei, " Regulatory Enforcement in a Federalist System", *American Political Science Review*, (80(4) December 1986) 1249.

[2] Anderson, 98.

[3] U.S. Environmental Protection Agency. 40 CFR 257, et al., "Standards for the Use and Disposal of Sewage Sludge; Final Rules," *Fed. Reg.*58:32 (1993).

> It is the purpose and intent of this ordinance to regulate the land application of biosolids in a manner that is consistent with agronomic rates which protect public health, ground and surface waters, and agricultural markets.
>
> It is the intent of the Board of Supervisors to manage the land application of sewage sludge consistent with, but not limited to, the intent and scope of U.S. EPA's 40 CFR, Part 503 regulations for sewage sludge.

Ordinance 696.1 seeks to forge a link between the objectives of the federal government with the needs of the local environment. Uniform national standards, such as Part 503, cannot accommodate the variety of local needs.[4] A "one-size-fits-all" approach to address the wide array of variables in soils and sludges is limited in both political and environmental considerations to prevent the uptake of pathogens and inorganic pollutants in fields where biosolids have been applied while addressing local policy issues. The Board of Supervisors sought to address local issues by utilizing 503 as a guideline but not a limitation on what local government can do.

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[4] Robert W. Lake, "Central Government Limitations on Policy Options for Environmental Protection", *Professional Geographer*, (46(2), 1994) 237.

Another factor that has limited the implementation of Part 503 is the fact that the USEPA has not yet delegated permitting authority to the States to implement these national standards.[5] Riverside County has decided to incorporate the federal technical standards while developing its own permitting rules, some of which are more strict than those imposed by the federal government (examples of this will be shown later in this paper).

The USEPA, in delegating authority to enforce Part 503, is attempting to establish a relationship with the states that is described by the partial preemption model. Partial preemption establishes national regulatory standards but provides for state enforcement.[6] In the case of Ordinance 696, Riverside County assumed the preemptive role unilaterally by referencing federal standards. The federal standards provide a solid foundation for the County

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[5] Nora Goldstein, "EPA Streamlines Biosolids Management Programs", *Biocycle: Journal of Composting and Recycling*, (36 (7) July 1995) 58.

[6] David M. Hedge and Michael J. Scicchitano, "Regulating in Space and Time: The Case of Regulatory Federalism", *The Journal of Politics* (56(1), February 1994) 134.

to address local issue and problems relating to the land application of sludge. The permitting and enforcement provisions of 696 fill the gap in the implementation of Part 503.

It is a common assumption by citizens and political pundits that once a policy decision is made and passed into law the desired outcome will result. Unfortunately, this is not always the case.[7] Knowing the goals that have been set for a program by the courts, the Congress, the President or the Board of Supervisors usually only provides a general hint of what will actually be done by the agency assigned the task of implementing the required activities. The purpose of studying policy implementation is to increase the understanding of what actually happens after a program is enacted or formulated. This includes the efforts to administer the program and the impacts that the directives have on people.[8]

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[7] E.S. Quade, *Analysis for Public Decisions: Revised edition by Grace M. Carter*, Third Edition, (Englewood Hills, NJ: Prentice Hall, 1989) 339.

[8] Daniel A. Mazmanian and Paul A. Sabatier, *Implementation and Public Policy* (Glenview, IL: Scott Foresman and Company, 1983) 4.

Implementation Theory

The study of policy implementation had been largely ignored by scholars until it was "discovered" by Jeffery Pressman and Aaron Wildavsky in 1973 when they published their seminal work, Implementation, where they studied the apparent failure of a federal job creation program in Oakland, California.[9] One reason for the long term neglect of implementation by academia may have been due to the naive assumption that the implementation process was simple or mundane and contained no issues worthy of attention by scholars.[10] Studies tended to focus on improving the quality of the decision making process in an attempt to increase the probability of designing a successful program.[11] Yet if the policy decision is not carried out

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[9] Jeffery Pressman and Aaron Wildavsky, *Implementation: How Great Expectations in Washington are Dashed in Oakland* (Berkely, CA: University of California Press, 1973)

[10] D.S. Van Meter and C.E. Van Horn, "The Policy Implementation Process": *A Conceptual Framework, Administration and Society* vol. 6 no. 4, February 1975, page 450-451. cited in Talib Younis, *Implementation in Public Policy*, Gower Publishing Company, Brookfield, Vermont, page 4.

[11] Younis, page 4.

by the appointed agency in an effective manner then even the most beneficial enactment will be of little or no value to the public. The implementation process consists of all the actions taken by the appointed administrative agency and other actors in order to implement or enforce the legislation after its adoption.[12] The purpose of public policy is to work toward resolving a public problem.

Tractability of Regulated Behavior

Some social problems are easier to manage than others. Regulating the land application of sludge is inherently easier to mange than a complex issue such as preventing teen violence. There is a much clearer understanding of the theoretical basis for the public health and environmental concerns surrounding the land application of sludge. For example, to prevent the uptake of pathogens by crops in fields where sludge has been applied site restrictions have been imposed. The definition of "site restrictions" in 696.1 reads:

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[12] Portney, 42.

"Site Restrictions" as established by resolution adopted by the Board of Supervisors or U.S. EPA 40 CFR, Part 503.32(b)(5) shall mean the period of time which elapses between an application of sewage sludge to a site and such time when:

(1) public contact is allowed;
(2) grazing by animals whose meat or products are consumed by humans is allowed;
(3) pasture land is subsequently converted into a dairy pasture, grazed upon by milking animals; or
(4) harvesting of crops is allowed.

By monitoring the time between the placement of sludge in a field and when the crop is harvested pathogens in the soil will decay to acceptable levels.[13] As the federal site restrictions are updated, or should the Board wish to make changes to the site restrictions rule, these standards can be amended through a resolution rather than by revising the entire ordinance. For example, the federal regulations allow melons to be harvested fourteen months after Class B sludge has been applied to the farmland.[14] The Board of Supervisors, in RESOLUTION NO. 91-057 - "ESTABLISHING TECHNICAL STANDARDS GOVERNING LAND APPLICATION OF SEWAGE

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[13] National Research Council, 96,97.

[14] U.S. Environmental Protection Agency, 40 CFR, Part 503, Standards for the Use or Disposal of Sewage Sludge; Section 503.32(b)(5)(i). [58:32] (February 19, 1993).

SLUDGE UNDER 696" (91-057), have decided that in Riverside County melons should not be planted until thirty-eight months following the application of sludge. This restriction is based on the conservative standards recommended by the "Manual of Good Practice for Landspreading of sewage Sludge."[15]

Diversity of Proscribed Behavior

The more diverse the proscribed behavior the more difficult it becomes to frame clear regulations.[16] Many of the criteria for regulating the land application of biosolids are straight forward and lend themselves to prescriptive, measurable standards. The Rational Model of Policy implementation describes an orderly process of receiving and carrying out instructions to achieve a predictable outcome.[17]

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[15] California Department of Health Services, Sanitary Engineering Branch, *Manual of Good Practice for Landspreading of Sewage Sludge*, (Sacramento, CA: April 1983) 10.

[16] Mazmanian and Sabatier, 23.

[17] Alfred A. Marcus, *Promise and Performance: Choosing and Implementing an Environmental Policy*, (Westport, CN: Greenwood Press, 1980) 21.

Also it is helpful in implementing a policy if the target population is a small percentage of the overall population.[18] Relatively few organizations participate in the sludge application business. It is an activity that occurs out in the open over wide expanses of agricultural land and does not lend itself to clandestine behavior, such as bootlegging videotapes of copyrighted Hollywood movies. Though midnight dumping of sludge and other regulated wastes is a problem facing environmental enforcement agencies, it does not generally fall under the purview of 696.

Currently 91-057 establishes technical standards for: the cumulative application rates of cadmium, copper, nickel, lead and zinc; the annual application rate for nitrogen and heavy metals; lifetime application rate of sludge; resting periods (i.e., site restrictions as described above); and requirements for Sludge Management Plans required to be submitted by the applicator. Compliance with these criteria is determined through

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[18] Mazmanian and Sabatier, 23.

sampling and laboratory analysis and review of applicants proposals for land application practices. Randomly measuring for these criteria deters an operator from land applying a load of contaminated sludge. An inspector from the Department of Environmental Health takes at least one sludge sample and a soil sample from each field where sludge is applied.

Discretionary Bureaucratic Behavior

For a policy decision to structure its own implementation it is important to assure that the legislative mandates are carried out by administrative agencies.[19] The proposed Ordinance 696.1 will be applied prescriptively in regulating buffer zones. Buffer zones are strips of land where biosolids cannot be placed during land application. These "no sludge" areas are usually in close proximity to sensitive receptors such as schools, residential property, hospitals, food facilities, parks, ground water, and surface water. For example, Part 503.14(c) states:

[19] Mazmanian and Sabatier, 23.

> Bulk sewage sludge shall not be applied to agricultural land, forest, or a reclamation site that is 10 meters or less from waters of the United States, as defined in 40 CFR 122.2, unless otherwise specified by the permitting authority.

However, the ordinance allows for some discretion by environmental health staff in determining if the prescribed buffer zone is adequate. This gives greater discretion and substantial latitude to the bureaucrats required to interpret and implement the ordinance. Discretion can be described as unclear authority delegated to bureaucrats to act on their own without regard to instructions.[20] A well written standard operating procedures manual should provide guidance for discretionary acts.

A buffer zone of ten meters (approximately thirty-three feet) is a national standard designed to protect surface waters, such as creeks, rivers, intermittent flowing streams, and lakes from pollutants that may be present in sewage sludge. The Department of Environmental Health is a 50 foot buffer zone as an absolute minimum from surface waters and that even more exacting buffer zones may

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[20] Marcus, 21.

be imposed if the following criteria in the 696.1 Section F, Specifications: (11)(b) are followed:

> The Department may require more restrictive buffer zone distances, and may set buffer zones between sewage sludge application areas based on: adjacent land uses, existing condition of ground water or surface water, sludge application rates, water content of the sludge, slope of the land, soil permeability and other factors that the Department deems relevant to the protection of public health and the environment. In making this determination, the Department may consider adjacent application rates, sewage sludge quality, land slopes, vegetated filler strip and other factors considered relevant by the Department.

The fact that some of the risk factors associated with the land application of sludge are objectively measurable minimizes the discretionary aspects of policy implementation. Yet the above insert shows that when the prescribed guidelines are utilized considerable discretion is granted to bureaucrats implementing this policy. However, there are a series of "checks and balances" built into this discretionary allowance. The Department must base its discretionary decision on factors such as adjacent land use, proximity of ground water, topography, etc.

Causal Relationships

To implement a public policy there needs to be a strong and valid cause and effect relation ship between governmental intervention and the attainment of program objectives. Additionally, the official responsible for implementing the program must have control over enough critical linkages to actually attain the objectives.[21] In Ordinance 696 the exactness of the cause and effect relationship creates a strong link between the actions expected of field staff and the requirements to successfully perform the policy.

The county's sludge management program, as required in 91-057, includes testing the soil in fields where sludge will be applied. Besides measuring the background levels of inorganic pollutants prior to applying sludge to a field, other chemical characteristics, such as pH, cation exchange capacity (CEC), and organic matter (OM) are taken into consideration. These test criteria not only measure for the presence of metals in a field but also tests other

[21] Mazamanian and Sabatier, 25,26.

soil properties that influence the movement of metal pollutants. These soil factors control the toxicity of metals to plants and limit transit into the human food chain[22]. Though these mechanism are complex and not completely understood research has shown that when these standards are adhered to in biosolids application programs it is reasonable to expect adequate protection to public health and the environment.

A soil's CEC measures the ability of a soil to bond with positively charged heavy metal ions (cations) that are found in sludge. The CEC test measures the capability of the soil to sequester pollutants thereby limiting the pollutant's movement as well as its bioavailability to plants. Clayey soils tend to have a higher CEC than sandy soils and therefore could accept a higher metal concentration from sludge. For example, a soil with a CEC greater than 15 milliequivalents per 100 grams of soil

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[22] R.L. Chaney. Crop and Food Chain Effects of Toxic Elements in Sludges and Effluents. In: *Proceedings of the Joint Conf. on Recycling Municipal Sludges and Effluents on Land.* Champaign, IL. (July 9-13, 1973). National Assoc. State Univ. and Land Grant Colleges, Washington, D.C. 129-141.

(meq/100g) is able to remove more cations than a soil with a CEC of 5 meq/100g. Ordinance 696 currently considers a soil's CEC when determining the cumulative amount of inorganic pollutants that are permitted to be applied to a field. This policy is straightforward and unambiguous when it comes to required monitoring activities necessary to minimize the links in the chain.[23]

The accumulation of trace metals in a field is measured in kilograms per hectare (kg/ha). The table below compares the cumulative pollutant loading rate of Part 503 with the maximum cumulative application of Ordinance 696:

Table 5-1--Inorganic Pollutants

[23] C. Ham and M. Hill, *The Policy Process in a Modern Capitalist State*, (Sussex, UK: Wheatsheaf, 1984) 99.

Metal Pollutants Measured	Part 503.13: Cumulative Pollutant Loading Rate	Ordinance 696 Maximum Cumulative Application of Heavy Metals to Agricultural Land[24] Cation Exchange Capacity in meq/100g:		
		<5	5-15	>15
	kg/ha	kg/ha	kg/ha	kg/ha
Zinc	2,800	250	500	1000
Copper	1,500	125	250	500
Nickel	420	50	100	200
Lead	300	400	800	800
Cadmium	39	5	10	20
Arsenic	41	N/A	N/A	N/A
Chromium	3,000	N/A	N/A	N/A
Mercury	17	N/A	N/A	N/A
Molybdenum	75	N/A	N/A	N/A
Selenium	100	N/A	N/A	N/A

This table shows that the local accumulative rates of metals to agricultural fields are much stricter than those imposed by the federal government. Additionally the County's limitations take into account the CEC of the soil therefore providing greater protection of health and the environment. It should also be noted that though the federal levels are more liberal they also impose

[24] Levels for zinc, copper, nickel, lead, cadmium, recommended by the *Manual of Good Practice for Landspreading of Sewage Sludge*.

restrictions on arsenic, chromium, mercury, molybdenum, and selenium which are not currently covered by 696.

The revision 696 will most likely abandon the stricter heavy metal application rates of the current version and adopt 503's risk based pollutant limits.

The following chapter will discuss the conclusions of this Graduate Research Project and make recommendations for the future implementation of Ordinance 696.

CHAPTER 6

Conclusion and Recommendations

Policy making is, or at least should be an ongoing, iterative process. Especially in the environmental field where science and technology are the engines of change requiring continual re-evaluation and upgrading of policies and implementation activities.

The citizen activists of the Palo Verde Valley were able to get their concerns into the political arena and adopted as a public policy as were the proponents of biosolids utilization. Both groups effectively thrust their demands on the political system to force it to act. The political system determined that these inputs were worthy public issues. An outright ban on the use of sludge as a soil amendment was not the policy of choice. Rather, the Department of Environmental Health, at the Direction of the Board of Supervisors, determined that *when managed properly*, the benefits of using sludge as a soil outweighed the risks. The outcome was a program devised to control those risks while addressing both the concerns of the activists and allowing the biosolids industry to continue

to go about their business, albeit with increased government oversight.

The political system was receptive because the inputs of the grassroots activists occurred in the social and historical context created by the environmental movement and other social changes of the late nineteenth and twentieth century. The door was opened for more democratic influences from ordinary citizens. Access to the political system on policy matters regarding natural resources and impacts from pollution was once only the domain of industrialists and elitist members of American society. The political system became more receptive to amalgamations of smaller voices.

Well-established political theorists support these conclusions. Easton's Political Systems Theory examined, from a broad perspective, the dynamic interactions between a government and its environment in a democratic structure. Jones's Policy Process approach identified the stages through which a policy develops as it passes through a sequence of activities within the political system to generate the policy or "product." The lenses of these

theoretical concepts were useful in the analysis of Ordinance 696. The outcome was a compromise among those concerned and involved with developing the policy which resulted from inputs to the political system.

The seventeen-question original survey conducted especially for this project revealed the experiences of other local jurisdictions in managing the land application of biosolids. Citizen activists played a role in influencing their jurisdictions in some circumstances though they were not always as successful as the citizen activists of the Palo Verde Valley. Though the mechanisms for implementing local policies varied considerably among jurisdictions, most of them believed that their local rules, or lack of such, provided adequate protection to public health and the environment.

Future Research

Suggestions for additional research to further address these are:

- Conduct a survey of State agencies to determine their opinions of the adequacy of the regulation of the

land application of sludge and determine their views on the adequacy of local rules.

- Further study the gradual decentralization of Federal and State responsibility that is being passed to local government in the area land application of sludge.

- Conduct scientific research to evaluate the effectiveness of Ordinance 696 over time. Does 696 actually provide protection to public health and the environment, specifically in Riverside County? Analyze 696 to determine if there are actual mitigations of the impacts of sludge on crop production, ground water, surface waters, and health risks.

Recommendations

The implementation theories of Mazmanian and Sabatier provided an analysis of some of the parameters of 696. The proposed revision to 696 should adopt the regulatory standards of the federal Part 503 regulations while maintaining local distinctions such as its permitting and enforcement standards. The problems of land application of sludge are tractable in that they can be readily measured

by field staff with little need for subjective interpretation. The singularity of the behavior regulated by 696, the lack of discretion delegated to the Department of Environmental Health in implementing the program, as well as a strong causal relationship among measured parameters (activities with potential negative environmental impacts) and government objectives (protection from negative affects) are among the factors that will lead to a more effective implementation of this ordinance.

However, the public continues to express concerns regarding the management of sludge in Riverside County: the county may be inadequately staffed to handle a large scale land application program. Ordinance 696 is very ambitious in the scope of its regulatory parameters and may be difficult to fully implement at the current staffing levels. These concerns have validity.

A time-task analysis should be conducted to determine how much staff time is spent in implementing this ordinance. Are all the required duties being properly performed? Certain aspects of 696 have not been adequately

enforced: such as determining if crops were planted or grazing allowed after the prescribed resting periods. The time task analysis must include analysis of all required staff activities not just those that are currently accomplished, and to determine if current staffing is adequate to meet these requirements.

The revenues and expenses of this ordinance need to be studied to assure that adequate funds are being collected to finance all the required implementation measures.

Concerns have been raised regarding how the county enforces the ordinance. There needs to be written "Standard Operating Procedures" for implementing this ordinance. This is the only program in the lacking a written, approved, departmental policy. Consistent and uniform procedures need to be based on the most current technology. The Department demonstrate the technical capability to protect the public from potential hazards that could result from the improper land application of sludge. Increased public education as to the land application of biosolids and the safeguards provided by 696 are also necessary.

Biosolids must meet or exceed the "Class B" standard for pathogens to be applied to agricultural. Currently sludge is not being tested for pathogen content, but only for inorganic pollutants and soil parameters.

The revision to 696 should also consider proposing standards to limit the land application of organic pollutants such as PCBs (polychlorinated biphenlys) and dioxins since such guidelines have not been proposed by State or Federal agencies. However, any standards proposed for organic constituents must be based on health risk based research.

Another reason to sample sludge prior to land application is to verify the data provided by the sludge applicator. The applicator obtains data from the sludge source prior to transporting sludge to the farmland for application. The Department's sampling procedures amount to verification monitoring to insure that the information provided by the applicator is accurate and does not pose a risk or nuisance to the public.

A computer data base, capable of tracking the accumulation of metals in the fields where it is applied is

an absolute necessity. The Department already possesses the software and computer capability to develop a heavy metal tracking database to monitor the accumulation of metals and the lab data on metals and pathogens in the biosolids on each field where sludge has been applied. The data base could also track the results of staff compliance inspections.

APPENDIX A

ORDINANCE NO. 696
AN ORDINANCE OF THE COUNTY OF RIVERSIDE
REGULATING THE LAND APPLICATION OF SEWAGE SLUDGE

The Board of Supervisors of the County of Riverside Ordains as Follows:

Section 1. Purpose and intent.

It is the purpose and intent of this ordinance to regulate the land application of sludge in a manner that is consistent with agronomic rates which protect public health, ground and surface waters, and agricultural markets.

Section 2. Definitions.

Whenever in the ordinance the following terms are used, they shall have the meanings respectively ascribed to them in this section.

A. **"Agronomic Rate"** shall mean sludge applications that do not exceed nitrogen fertilizer rates for the crop to be grown and do not result in phytotoxicity (accumulation of heavy metals and/or nutrients adverse to normal vegetative growth).

B. **"Applicator"** shall mean any person, company, organization, or other legal entity engaged, or about to become engaged with the placement of sludge on land at a controlled rate for the purpose of reusing sludge and enhancing the growth of plants in accordance with the provisions of this ordinance.

C. **"County"** shall mean the County of Riverside, State of California.

D. **"Department"** shall mean the Department of Health of the County of Riverside.

E. **"Field"** shall mean a discrete, discernable, and identifiable individual piece of land used for crop production, designated or under consideration for Sludge use, generally not more than 160 acres in size, unless soils or other physical features are largely homogeneous.

F. **"Field Crops"** shall mean those crops including but not limited to cotton, small grains, corn, milo, forage crops, seed crops, oil crops, vine and tree crops.

G. **"Good Quality"** shall mean the quality of Sludge is such that it can be applied on a site at a rate sufficient to provide a significant benefit to plant growth, by adding plant nutrients, and/or improving soil structure by adding organic matter in accordance with the provisions of this ordinance. Good Quality shall also mean at

a minimum "stabilized Sludge" as per the Manual of Good Sludge Management, State of California, 1983.

H. **"Grower"** shall mean the operator of the site involved in production of field crops.

I. **"Health Officer"** shall mean the Health Officer of the County of Riverside or his designated representative.

J. **"Irrigation Tail Water"** shall mean the excess water applied to a field that does not infiltrate the soil, but collects at the lower end of a field.

K. **"Land Application"** shall mean the placement of sludge or treated sewage sludge within three (3) feet of the surface of agricultural or marginal land intended to support vegetative growth.

L. **"Marginal Land"** shall mean land where the soil characteristics do not support normal vegetative growth over time. Marginal land includes, but is not limited to, strip mine areas, areas where topsoil has been removed, fill areas with poor soil characteristics, and completed landfills with poor top soil.

M. **"Person"** shall mean any person, firm, business, city, county, district, special district, including a water district, sole proprietorship, partnership, joint venture, trust, association, or corporation whether for profit or non-profit.

N. **"PFRP"** shall mean a process to further reduce pathogens as defined by Environmental Regulations and Technology; Control of Pathogens in Municipal Wastewater Sludge, U.S. EPA Technology Transfer #625-10-89-006, September 1989, and 40 CFR Part 257, Federal Register, September 1979 as it may be amended.

O. **"PSRP"** shall mean a process to significantly reduce pathogens as defined by Environmental Regulations and Technology; Control of Pathogens in Municipal Wastewater Sludge, U.S. EPA Technology Transfer #625/10-89-006, September 1989, and 40 CFR Part 257, Federal Register, September 1979 as it may be amended.

P. **"Resting Periods"** as established by resolution adopted by the Board of Supervisors shall mean the period of time which elapses between an application of Sludge to a site and such time when;

(1) public access is allowed;

(2) grazing by animals whose products are consumed by humans is allowed;

(3) if pasture is subsequently converted into a dairy pasture, grazing by milking animals; or

(4) there should be no planting of unprocessed food crops.

Q. **"Site"** shall mean one or more fields owned by a single person. The distance between any two shall be no greater than five miles.

R. **"Sludge"** shall mean the accumulated matter produced in the treatment of wastewater. This includes liquid, semi-liquid, and solid material that has mean mechanically dewatered or air dried. Wastewater treatment plant "grit" and "bar screenings" are not included as part of this definition.

S. **"Sludge Staging Area"** shall mean the location on a site, where sludge is deposited on the ground for loading onto a vehicle, for application, on the same or nearby sites in connection with an approved Sludge Management Plan.

T. **"Treatment"** shall mean a process which alters, modifies, or changes the biological physical or chemical characteristics of sewage sludge.

U. **"Vehicle"** shall mean any motorized or non-motorized conveyance used to transport sludge.

V. **"Wastewater Treatment Plant"** shall mean a facility designed and constructed to receive, treat, or store sewage combined with waterborne waste.

Section 3. General Requirements for Approvals

A. No person shall land apply sludge in the County without first having obtained approval of a Sludge Management Plan including those elements established by resolution of the board of supervisors, and having paid all fees.

B. **Applications for Sludge Management Plan Approval**

Applications for Sludge Management Plan approvals shall be made to the Health Officer upon forms provided by the Department, shall be accompanied by an application fee as established by resolution of the Board of Supervisors and shall include the following information:

1. Name and address of the applicant.
2. Type of organization such as sole proprietorship, partnership, joint venture, corporation, business trust of company including names, home addresses and percentage of ownership of all owners and officers. Information as to ownership interest of less than one percent (1%) need not be provided.

3. Consent to examine financial statements of the applicant and its parent corporation if the applicant is a subsidiary or division. Financial statements shall be available for at least the last three (3) years and shall indicate whether the statements have been audited. The financial statements shall consist of at least the following documents:

   a) balance sheets;

   b) statements of income;

   c) statements of retained earnings; and

   d) statements of cash flows.

4. Identification of the local manager and responsible office personnel.

5. A statement setting forth facts demonstrating that the applicant owns or has access to suitable facilities for equipment cleaning, maintenance, storage, and business offices. The addresses of all such facilities shall be provided with the application. Included with this statement shall be documentation indicating these facilities are properly zoned and constructed consistent with appropriate local ordinances.

6. A statement regarding the applicant's experience and capability in the collection and transportation of sludge.

7. Evidence that the applicant can provide insurance policies in the amounts specified in Section 7.

8. Evidence that the applicant can provide a bond in accordance with the specification in Section 8.

9. A list of vehicles to be used for the transportation and/or application of bosolids, including;

   a) A list of vehicle identification numbers;

   b) The type, year, make, model, mileage, license numbers, company vehicle numbers and intended use of all vehicles.

10. All technical standards as specified by resolution adopted by the Board of Supervisors.

11. Whatever information in the application and supporting documents is considered to be proprietary information by the applicant should be clearly marked as such. Once such information has been marked as proprietary, it

may not be released to the public or other applicants. The Health Officer may invite existing Applicators to review all non-proprietary information on file with the County, included with the application.

12. Any other relevant information requested by the Department.

C. Applications for Sludge Application Site Approval

1. After the Sludge Management Plan has been approved, initial applications for each Sludge Application Site shall be made to the Health Officer upon forms provided by the Department, shall be accompanied by an approval fee as established by resolution of the Board of Supervisors and shall include the following information:

   a) Name, address and phone number of the grower and land owner with evidence of grower and land owner agreeing to sludge use, resting periods, allowable crops, right of entry and any other conditions;

   b) Legal description of site location;

   c) The site plotted on a scale reproduction of a section of the 1.24.000 scale United States Geological Survey Quadrangle Map for the area or at a scale acceptable to the Department;

   d) The site plotted on a scale reproduction of a Soil Survey Map for the area as published by the United States Soil Conservation Service, United States Department of Agriculture and Cooperative Extension Service;

   e) A list of predominate soils on the site;

   f) A tabulation of site information to include net acreage (to nearest 0.1 acre), depth to regional ground water, annual application rate, lifetime application rate, and buffer zones for occupied dwellings, property lines, roads and wells;

   g) A detailed site plan prepared at a scale of one inch equals 660 feet or at a scale acceptable to the Department depicting the site boundary, limits of sludge application and homes, wells, irrigation structures and dikes within 500 feet of this site;

   h) Representative soil sample analyses for pH, cation exchange capacity, and background metal concentrations. Metal concentrations shall be limited to those levels specified in resolution by Riverside County Board of Supervisors.

i) Only sludge treated by a PSRP or PFRP may be applied to agricultural land. Sewage sludge laboratory analysis data that the Department considers adequate to assess the potential public health and environmental impacts of the project shall be provided. As a minimum requirement the results of one laboratory analysis for a representative sample of the sludge which meets the following criteria shall be submitted:

1) The sample was obtained not more than twelve (12) months before submission of the application;

2) The analysis includes percent for solids, pH and the dry weight concentration of total nitrogen, ammonium, nitrate, total phosphorus, total potassium, cadmium, copper, lead, nickel, and zinc; and

3) The analysis includes the concentration of Polychlorinated Biphenyl (PCB).

j) The transportation route from the wastewater treatment plant generating the sludge to the site.

k) Approval of the Regional Water Quality Control Board, as appropriate.

l) Statement by the County Agricultural Commissioner indicating the recommended agronomic rates. Such recommendation may be site and crop specific.

m) Any other relevant information requested by the Department.

2. Application for Marginal Land Site. The Department will evaluate proposed projects on marginal lands on a case-by-case basis. The projects will be evaluated on technical merit, enhancement of the environment and impact to public health. Fees and approval requirements will be established based on the scope of the projects.

Section 4. Action on Applications for Sludge Management Plan and Sludge Application Site Approvals

A. Applicants shall be notified of incomplete or inaccurate applications within ten (10) working days after the date of the filing of the application. The applicant may make the proper corrections and resubmit the corrected application. The applicant may make the necessary corrections and additions and resubmit the application within 30 days of notification.

B. All complete and accurate applications for Sludge Management Plan and Sludge Application Site Plan Approvals shall be approved or denied, in whole or in part, within fifteen (15) working days after the date of filing or shall be deemed approved. If an application is denied, in whole or in part, the applicant may amend the application and resubmit the amended application.

C. Denial of application may be for one or more of the following causes, or for other reasons as specified by the Health Officer:

1. Lack of responsibility as shown by past work.
2. Lack of competency as revealed by financial statements, experience or inadequate equipment.
3. Inadequate, incomplete, or inaccurate information on the sludge management application submitted.
4. Inadequate, incomplete, or inaccurate information on the sludge application site application submitted.
5. The plan proposes an application that is not environmentally sound.
6. Other reasons as specified by the health officer.

Written notice of the denial of an application for a new Sludge Management Plan or new Sludge Application Site Approval, shall be given by personal delivery or by mailing by certified mail to the applicant at the address on file with the Department.

D. Approvals granted for Sludge Management Plans shall be valid for a period not to exceed five (5) years, but may be issued for any period of less than five (5) years.

E. Sludge Management Plan Approvals shall be renewed provided the terms of the initial Sludge Management Plan continue to be met, the provisions of this ordinance are complied with and the renewal fee is paid.

F. Sludge Application Site Approvals shall remain valid as long as the Sludge Management Plan is in force and effect.

G. A Sludge Management Plan Approval or Sludge Application Site Approval may be rescinded by the Health Officer whenever the applicator has violated a provision of this ordinance or State rules or regulations, discharge order of the water quality control board, or is in noncompliance with a resolution of the Board of Supervisors. In such instance, a written notice to this effect shall first be delivered in person or by certified mail to the business address of the applicator appearing on the application. The written notice shall state the grounds for the proposed rescission.

H. The applicator may appeal such proposed rescission of the Health Officer by filing a written request for a hearing before the Board of Supervisors with the Clerk of the Board not more than fifteen (15) calendar days after notice of the proposed rescission has been given. Upon receipt of a written request for a hearing, the Clerk of the Board shall set the matter for public hearing on a date not more than sixty (60) calendar days following receipt of such written request, and shall give the applicant and the Board of Supervisors at least thirty (30) calendar days written notice of the time, date, and place of the hearing. The Board of Supervisors, or a hearing body or officer appointed by it to hear the case, shall issue its written decision and findings on the appeal within thirty (30) calendar days after the close of the hearing. Such decision will be final. Where the approval is rescinded, the applicator shall terminate operations forthwith as determined by the Board of Supervisors.

Section 5. Fees

A. There shall be a fee required to obtain an approval of the Sludge Management Plan and for a Sludge Application Site under the provision of this ordinance as specified in a resolution adopted by the Board of Supervisors. Such fees shall be in amounts based upon a cost-analysis determined by the Riverside County Auditor-Controller to be an amount necessary to fully fund the costs incurred by the County in administering this program.

B. There shall also be a monitoring fee for each sludge application site as specified in a resolution adopted by the Board of Supervisors based on the tons of sludge applied at each application. The fees shall be due within thirty (30) days of the sludge application.

Section 6. Delinquency Dates And Penalties

A. The delinquency date shall be, in the case of renewal, the thirtieth (30th) day following the expiration date shown on the Sludge Management Plan.

B. If any fee specified is not paid prior to the delinquency date, the applicant shall pay, in addition to such fee, a penalty in the amount of twenty percent (20%) for such fee; if any fee specified is not paid within sixty (60) days of the delinquency date, the applicant shall pay in addition to such fee, a penalty in the amount of one hundred percent (100%) of such fee.

Section 7. Insurance

A. The applicator shall, at all times during the term of the approval, maintain in full force and effect workers' compensation insurance, and a minimum of $1,000,000 General Liability insurance, and a minimum of $1,000,000 of pollution insurance. All insurance shall be by insurers and for policy limits acceptable to the County. Before commencement of any work, the Applicator shall furnish the County with certificates of insurance, or other evidence satisfactory to County, indicating that insurance has been procured and is in force. The certificates shall include the following express obligation:

"This is to certify that the policies of insurance described herein have been issued to the insured for whom this certificate is executed and are in force at this time. In the event of cancellation or material change in a policy affecting the certificate, notice will be given the certificate holder."

B. In the event applicator's insurance coverage fails or lapses, the approval issued hereunder shall terminate immediately, and Applicator shall be deemed in default.

C. Applicator shall be under a duty to promptly notify the Health Officer of any cancellation or non-renewal of insurance coverage.

Section 8. Bonds

A. Security Bond.

Applicator shall furnish a corporate surety bond as security for performance under the approval. The amount of the bond shall be the average of two-months expected gross income derived from transportation and use of sludge in Riverside County. The Department shall have the right to require a surety bond in the above-described amount, such right to be dependent upon the reasonable need thereof, as may be determined by the Health Officer.

B. Premium.

Premium for the above-described bond(s) shall be paid by the Applicator. A certificate from the surety showing that bond premiums have been paid, in full, shall accompany the bond.

C. Authorized Company.

The surety on the bond shall be a company acceptable by the County and shall be a corporate surety company authorized to do business in the State of California.

D. Transferability of Approvals.

No assignment or transfer whether voluntary or involuntary of the approvals issued under this ordinance or any right thereunder, shall be made in whole or in part by the applicator without the expressed, prior written consent of the Health Officer. A decision on such transferability shall rest within the sole discretion of the Health Officer and shall be issued within thirty (30) calendar days of receipt by the Health Officer of all documentation regarding the proposed transfer.

Section 9. Conditions For Operations

A. Site Restrictions.

Sludge use shall be limited to bonafide agricultural, horticultural, and silvacultural sites where crops are established and harvested, and marginal lands as approved by the Health Officer. Sludge may be reapplied each time a crop is removed. A crop must be planted within 18 months from the first date of sludge application on a site.

B. Sludge Quality.

Only sludge of good quality shall be used.

C. Sludge Incorporation.

Land applied sludge shall be soil incorporated by discing or other suitable tillage implement within 24 hours from the time of application. Sludge incorporation shall be thorough, including residues in staging areas.

D. Tail Water Control.

Tail water shall not be discharged from any field on which sludge has been applied unless such discharge has been approved by the Department.

E. Spill Control.

The applicator shall establish and maintain an ongoing spill prevention and response program.

F. Allowable Crops.

Sludge may be used on field crops. Other crops will be evaluated by the Health Officer on a case by case basis.

G. Sludge Use Agreements.

The applicator shall obtain written evidence that the grower and land owner are desirous of receiving sludge and that they both agree to observe resting periods, and crop restrictions as established in resolution of the Board of Supervisors.

H. Resting Periods.

Resting periods as established by resolution of the Board of Supervisors shall be observed for sites receiving sludge. The applicator shall physically inspect sites receiving sludge at least annually and certify to the Department that appropriate resting periods are observed. Any resting period violation shown by the applicator shall be reported to the Department within seven (7) days from the date of discovery.

I. Advance Site Notice.

The applicator shall notify the Health Officer in writing at least 24 hours in advance of delivery to the site.

J. Site Identification.

The areas to receive sludge application shall be clearly marked with stakes or other prominent markers as approved by the Department before the sludge application.

K. Buffer Zones.

1. Unless treated by PFRP as defined, sludge shall not be land applied within the buffer zones established by the Regional Water Quality Control Board, to ensure surface and groundwater protection, which are as follows:

   a) Fifty (50) feet from property lines unless written permission is obtained from the adjacent landowner;

   b) Five-hundred (500) feet from domestic water wells;

   c) Five-hundred (500) feet from occupied dwellings; and,

   d) Fifty (50) feet from public roads.

2. The Department may require increased buffer distances and may set buffer zones between sludge application areas based on adjacent land uses. In making this determination, the Department may consider adjacent application rates, sludge quality, land slopes, vegetated filler strip and other factors considered relevant by the Department.

L. Maintenance Yard.

1. Sludge transportation vehicle parking / service yards shall be maintained in a clean and safe condition.

2. Vehicle washing facilities that drain to an approved subsurface disposal system shall be required. The entire lot shall be adequately sloped for drainage control.

M. Vehicles.

1. Each vehicle shall have clearly visible, on each side, the identity and telephone number of the Applicator or DBA, in a size with letters of not less than three (3) inches in height.

2. Maintenance and repair work shall be logged and shall be made available for inspection by the Health Officer at reasonable times.

3. Vehicles shall meet all emission standards and limits on noise.

4. Vehicles shall be designed and maintained in such a manner as to prevent leakage of liquids or spilling, blowing or loss of material during transportation.

5. Vehicles shall carry a shovel, broom, fire extinguisher, and first aid kit.

6. Sludge Transportation. Vehicles transporting sludge shall be maintained in a neat and clean condition and in sound mechanical condition. All loads shall be fully tarped. Vehicle exteriors shall be free of sludge before entering public roads.

7. Vehicles Conditions. All vehicles must meet California Department of Transportation requirements and be equipped in a manner whereby effective communication with the Applicator's office can be maintained.

8. California Highway Patrol Inspection. Applicator shall cause its vehicles to be inspected by the California Highway Patrol annually, and a report of said inspection shall be provided to the Health Officer upon request.

9. Licenses and Taxes. The Applicator shall obtain and maintain, at its own expense, all required licenses and approvals and shall promptly pay all taxes required by the City, County, State, and Federal Governments.

10. Department's Review.

a) The Health Officer shall affix a distinctive, durable decal on each vehicle used by the applicator.

b) The Health Officer may suspend the use of said decal for any vehicle which fails to meet the requirements of this ordinance. Said vehicle shall not be used for collection, application, transfer, or removal of sewage sludge until it has been cleared in writing by the Health Officer for return to service.

N. Staging Areas.

Sludge staging areas shall be restricted to sites approved for sludge application. Staging areas must be located out of buffer zones. All sludge within a staging area must be land applied within 24 hours from time of delivery to the staging area. The staging area shall be sufficiently cleaned of sludge so the application rate within the staging area is equivalent to the approved application rate for the site.

O. Sludge Storage.

Sludge storage is not allowed except where specifically permitted by State Regulations.

Section 10. Technical Standards.

Technical standards governing sludge application rates, acceptable sludge criteria, cumulative soil metals, etc. shall be established by resolution adopted by the Board of Supervisors.

Section 11. Monitoring.

A. Sludge Testing.

The applicator shall submit a monitoring plan as specified by resolution adopted by the Board of Supervisors.

B. Soil Testing.

The applicator shall conduct sampling which conforms to the procedure specified by resolution adopted by the Board of Supervisors.

Section 12. Reporting.

The applicator shall file monthly reports with the Department within fifteen (15) days from the end of any reporting month in which activity occurs. The monthly report shall include those items specified in resolution by the Board of Supervisors.

Section 13. Sludge Load Records.

The applicator shall create and maintain an accurate record for each load of sludge used in Riverside County. An applicator shall maintain sludge records for a period of three (3) years. Such records shall be made available to the Health Officer for the purpose of verifying sludge quantities used. The sludge load record shall note the following:

A. source;

B. date and time picked up;

C. date and time delivered to use site;

D. use site identification;

E. load size; and,

F. vehicle(s) and driver(s).

Section 14. Right of Entry.

The applicator, farm operator, and land owner shall agree, as a requirement of the approval, to authorize the Health Officer at reasonable times and upon presentation of credentials to:

A. Enter upon the applicator's premises or location where any records are required to be kept under the terms and conditions of the approval;

B. Have access to and copy any records required to be kept under the terms and conditions of this approval;

C. Inspect any monitoring equipment or observe any monitoring method required in the approval;

D. Inspect any collection, transport vehicles, treatment, pollution management, or control facilities required under the approval;

E. Enter any site where sludge is proposed to be used or has been used or stored and sample any ground or surface waters, soils, vegetation, sludge or other materials on the site; and,

F. Obtain any photographic documentation or evidence.

Section 15. Enforcement.

It shall be the duty of the Health Officer or his agents to enforce the provisions of this ordinance.

Section 16. Violations.

Violations by any person, firm, partnership, association, or corporation, whether having obtained approval or not, of any of the provisions of this ordinance, constitutes an infraction or misdemeanor as hereinafter specified. Upon conviction thereof, the person or entity shall be subject to a fine of $100.00 for the first offense; $200.00 for the second violation within a one (1) year period; and $300.00 for each additional violation within the same one (1) year period. Fourth and additional violations within a one year period, shall each constitute a misdemeanor and shall be punishable by a fine not to exceed one thousand dollars ($1,000.00), or six (6) months in jail, or both. Notwithstanding the above, a first or subsequent offense may be charged and prosecuted as a misdemeanor. Payment of any penalty provided herein shall not relieve a person, as defined, of the responsibility of correcting the conditions considered as a separate and distinctive offense.

Section 17. Public Nuisance Declaration.

In addition, any violation of this ordinance is hereby deemed to be a public nuisance, and may be abated, or enjoined by the Health Officer or his designee, irrespective of any other remedy hereinabove provided.

Section 18. Severability.

If any clause, provision, sentence, or paragraph of this ordinance, or the application thereof, is deemed to be invalid as to any person, entity, establishment, or circumstance, such invalidity shall not effect the other provisions of this ordinance which shall still remain in effect, and to its end, it is hereby declared that the provisions of this ordinance are severable.

Section 19.

No person shall apply sludge to land within Riverside County following the effective date of this ordinance without being in full compliance with all terms and conditions of this ordinance.

Section 20. Effective Date.

This ordinance shall take effect thirty (30) days after the date of adoption.

[Signature Block on Originals]

GB:jf-1/11/91

APPENDIX B

DRAFT ORDINANCE NO. 696.1
AN ORDINANCE OF THE COUNTY OF RIVERSIDE REGULATING THE LAND APPLICATION OF SEWAGE SLUDGE

The Board of Supervisors of the County of Riverside ordains as follows:

Section 1. Purpose and intent.

It is the intent of the Board of Supervisors to manage the land application of sewage sludge consistent with, but not limited to, the intent and scope of U.S. EPA's 40 CFR, Part 503 regulations for sewage sludge.

It is also the purpose and intent of this ordinance to regulate in a manner that is consistent with agronomic rates which protect public health, ground and surface waters, and agricultural markets.

Section 2. Definitions.

The terms used in this ordinance shall be as defined in 40 CFR, Part 503, as it is amended from time to time, except for the following:

A. **"Agronomic Rate"** shall mean the annual whole sludge application rate (dry weight basis) designed to (1) provide the amount of nitrogen needed by the food crop, feed crop, fiber crop, cover crop, or vegetation grown on the land; and (2) minimize the amount of nitrogen in the sludge that passes below the root zone of the crop or vegetation grown on the land to the groundwater. In determining agronomic rate, nitrogen sources shall include commercial fertilizers, manures, irrigation waters, reclaimed waters, sludge, and any crops that add nitrogen to the soil, such as legumes.

B. **"Applicator"** shall mean any person, company, organization, or other legal entity engaged, or about to become engaged in the application of sewage sludge on land at a controlled rate for the purpose of reusing sewage sludge and enhancing the growth of plants in accordance with the provisions of this ordinance.

C. **"County"** shall mean the County of Riverside, State of California.

D. **"Crops"** shall include feed, food and fiber crops defined as:

1. **"Cover Crops"** shall mean a small grain crop, such as oats, wheat, or barley, not grown for harvest;
2. **"Feed Crops"** are crops produced primarily for consumption by animals;
3. **"Fiber Crops"** are crops such as, but not limited to, flax and cotton.
4. **"Food Crops"** are crops consumed by humans; these include, but are not limited to fruits, vegetables and grains;
5. **"Processed Food Crops"** shall mean those crops intended for human consumption which are subject to further processing, such as sugar beets.
6. **"Silvaculture crops"** trees grown on forest land intended to be harvested as timber; or trees grown for horticultural purposes.
7. Other crops as defined by 40 CFR, Part 503.

E. **"Crop year"** the period of time required to plant, grow and harvest a crop. (When more than one crop is harvested from a field during a calendar year, the "crop year" would be of shorter duration than the calendar year and there may be more than one crop year per calendar year.)

E. **"Department"** shall mean the Department of Environmental Health of the County of Riverside.

F. **"Director"** shall mean the Director of the Department of Environmental Health of the County of Riverside or his designated representative.

G. **"Field"** shall mean a discrete, discernible, and identifiable individual piece of land used for crop production, designated or under consideration for sewage sludge use, generally not more than 160 acres in size, unless soils or other physical features are largely homogeneous.

H. **"Grower"** shall mean the operator of the site involved in production of crops.

I. **"Irrigation Tail Water"** shall mean the excess water applied to a field that does not infiltrate the soil, but collects at the lower end of a field.

J. **"Land Application"** shall mean the placement of sewage sludge within three (3) feet from the surface land intended to support vegetative growth.

K. **"Person"** shall mean any person, firm, business, city, county, district, special district, including a water district, sole proprietorship, partnership, joint venture, trust, association, or corporation whether for profit or non-profit or any other entity whatsoever.

L. **"Site Restrictions"** as established by resolution adopted by the Board of Supervisors or U.S. EPA 40 CFR, Part 503.32(b)(5) shall mean the period of time which elapses between an application of sewage sludge to a site and such time when:

1. contact by the public is allowed;
2. grazing by animals whose meat or products, including milk are consumed by humans is allowed;
3. harvesting of crops is allowed.

M. **"Sewage Sludge, Sludge, or Biosolids"** shall mean the accumulated and stabilized matter produced at wastewater treatment facilities. Sewage sludge may be liquid, semi-liquid, or dry material. Sewage sludge shall also mean those waste water residuals having a "quality" such that it can be land applied to improve soil condition by adding organic matter and plant nutrients. The following terms define the classifications of sludge that may be applied to land in Riverside County:

1. **"Exceptional Quality Sludge"** shall meet the following requirements:

a. meet Class A status for pathogen reduction requirements of Part 503.32(a); and

b. not exceed the Maximum Pollutant Concentration requirements established in the technical resolution adopted by the Board of Supervisors; and

c. Shall meet Vector Attraction Reduction of Part 503.33(a)(2).

2. **"Class A Sewage Sludge"** shall mean sewage sludge that meets the Class A pathogen reduction requirements as defined in the U.S. EPA's 40 CFR, Part 503, Subpart D § 503.32(a); (fecal coliforms or other pathogens are below regulatory limits)

3. **"Class B Sewage Sludge"** shall mean those sewage sludges that meet Class B pathogen criteria as defined by U.S. EPA's 40 CFR, Part 503, Subpart D 503.32(b); (the level of pathogens are detectable

but are reduced to a level that does not pose a threat to public health when measures are taken to prevent exposure to the public.)

N. **"Site"** shall mean one or more fields owned by the same person.

O. **"Treatment"** shall mean a process which alters, modifies, or changes the biological, physical or chemical characteristics of sewage sludge.

P. **"Unloading Area"** shall mean the location on a site, where Class A or Class B sewage sludge is deposited on the ground for loading onto a vehicle, for application, on the same or nearby sites in connection with an approved Sewage Sludge Management Plan.

Q. **"Vehicle"** shall mean any motorized or non-motorized conveyance used to transport sewage sludge.

R. **"Wastewater Treatment Facility"** shall mean a facility designed and operated to treat, or store (including recycling, or reclamation) domestic sewage or industrial waste of a liquid nature.

Section 3. Prohibitions

A. No person shall apply sewage sludge that is not Class A, Class B, or exceeds the EPA's 40 CFR, Part 503, Subpart D, § 503.13, Table 3 Pollutant Concentrations to land within the County.

B. No person shall land apply Class B sewage sludge in the County without first having obtained an approved Sewage Sludge Management Plan as per Section 6. A. of this Ordinance and Site Application Plan as per Section 6. B. of this Ordinance including those standards established by resolution of the Board of Supervisors, and having paid all applicable fees.

C. No person shall handle Exceptional Quality Sludge, Class A, or Class B sewage sludge in an unloading area in an uncontrolled manner so as to cause a nuisance; steps shall be taken to minimize dust, odors, and surface runoff during inclement weather, such steps may include postponing unloading activities until such a time as when nuisance conditions can be prevented.

D. No person shall place Class A or Class B sludge onto a field unless it is incorporated into the soil within 24 hours.

E. No person shall place Class A or Class B sludge within 500 feet from, including but not limited to, the following sensitive receptors:schools or day care centers:

1. libraries
2. churches
3. hospitals, hospices or clinics
4. food facilities
5. hotels or motels
6. rest homes
7. residential dwellings

F. No person shall place Class A, or Class B sludge within 50 feet of any of the above sensitive receptors unless they have obtained the express written consent of the property owner.

G. No person shall place Exceptional Quality Sludge on property with an occupied dwelling or sensitive receptor unless such activity is approved by the property owner or tenant.

H. No person shall place Class B sludge within 200 feet from a water well.

I. No person shall place Class B sludge a distance of less than 5 feet from historical groundwater levels.

J. No person shall place Class B sludge within 50 feet of surface waters that meet the definition of the "Waters of the United States" as defined in 40 CFR 122.2. (The Department may require more restrictive buffer zones based on criteria found in Section 6(F)(10) of this ordinance).

K. No person shall place Class B sewage sludge within 50 feet of a public road.

L. No person shall apply Class B sewage sludge to land within Riverside County following the effective date of this ordinance without being in full compliance with all terms and conditions of this ordinance.

M. No person shall apply Class A or Exceptional Quality Sludge to land within Riverside County without certifying, as described in 40 CFR, Part 503 requirements for Class A pathogen reduction and vector attraction reduction have been met.

Section 4. Enforcement.

A. The Director, or his agent, is designated to enforce the provisions of this ordinance pertaining to the enforcement and management of the land application of sewage sludge.

B. No provision of this ordinance, nor the enforcement thereof, shall preclude the enforcement by the Director, the State of California, or the Federal Governement, of any provision of the California Public Resources Code or any other state regulations, or the Code of Federal Regulations as adopted pursuant to those provisions.

C. The provisions of any existing ordinance, State or Federal law or Environmental Assessment adopted by the Board of Supervisors affording greater protection to the public health and safety, shall prevail within this jurisdiction over the provisions of this ordinance and the standards adopted or incorporated by reference hereunder.

D. Anything done, maintained, or suffered in violation of any of the provisions of this ordinance, is hereby deemed to be a public nuisance dangerous to the health and safety of the public and may be enjoined or summarily abated in the manner provided by law. Every public officer or body lawfully empowered to do so, shall abate the nuisance immediately.

Section 5. Statutory Requirements

All of the provisions of 40 CFR, Part 503, as amended from time to time, are hereby incorporated by reference into this ordinance. 40 CFR, Part 503, contains requirements, in addition to those in this ordinance, for the land application of sewage sludge.

Section 6. Specifications

A. Applications for Sewage Sludge Management Plan approvals for the land application of Class B sewage sludge.

Applications for Sewage Sludge Management Plan approvals shall be made to the Director upon forms provided by the Department, shall be accompanied by an application fee as established by resolution of the Board of Supervisors and shall include the following information:

1. Name and address of the applicant.

2. Type of organization such as sole proprietorship, partnership, joint venture, corporation, business trust of company including names, home addresses and percentage of ownership of all

owners and officers. Information as to ownership interest of less than one percent (1%) need not be provided.

3. Consent to examine financial statements of the applicant and its parent corporation if the applicant is a subsidiary or division. Financial statements shall be available for at least the previous three (3) years and shall indicate whether the statements have been audited. The financial statements shall consist of at least the following documents:

   a) balance sheets;
   b) statements of income;
   c) statements of retained earnings; and
   d) statements of cash flows.

   Note:If the applicant is a privately held company a statement by a third party Certified Public Accountant that the company is in sound financial standing may be substituted for the above finanacial disclosure documents.

4. Identification of the local manager and responsible office personnel.

5. A statement setting forth facts demonstrating that the applicant owns or has access to suitable facilities for equipment cleaning, maintenance, storage, and business offices. The addresses of all such facilities shall be provided with the application. Included with this statement shall be documentation indicating these facilities are properly zoned and constructed consistent with appropriate local ordinances.

6. A statement regarding the applicant's experience and capability in the collection and transportation of sewage sludge.

7. Evidence that the applicant can provide insurance policies in the amounts specified in Section 7.

8. Evidence that the applicant can provide a bond in accordance with the specification in Section 8.

9. A list of vehicles to be used for the transportation and/or application of sewage sludge, including:

   a) A list of vehicle identification numbers;

b) The type, year, make, model, mileage, license numbers, company vehicle numbers and intended use of all vehicles.

10. All technical standards as specified by resolution adopted by the Board of Supervisors.

11. Whatever information in the application and supporting documents is considered to be proprietary information by the applicant shall be clearly marked as such. Once such information has been marked as proprietary, it may not be released to the public or other applicants. The Director may invite existing Applicators to review all non-proprietary information on file with the County, included with the application.

12. Any other relevant information requested by the Department.

B. Applications for Sewage Sludge Application Site approval(s) for the land application of Class B sludge

1. After the Sewage Sludge Management Plan has been approved, initial applications for each Sewage Sludge Application Site shall be made to the Director upon forms provided by the Department, shall be accompanied by an approval fee as established by resolution of the Board of Supervisors and shall include the following information:

a. Name, address and phone number of the grower and land owner with evidence of grower and land owner agreeing to sewage sludge use, resting periods, allowable crops, right of entry and any other conditions.

b. Legal description of site location.

c. If the site is subdivided, the subdivisions shall be labeled and shown on all plans. All reports shall be consistent with the subdivisions proposed by the applicant.

d. The site plotted on a scale reproduction of a section of the 1:24,000 scale United States Geological Survey Quadrangle Map for the area or at a scale acceptable to the Department.

e. The site plotted on a scale reproduction of a Soil Survey Map for the area as published by the United States Soil Conservation Service, United States Department of Agriculture and Cooperative Extension Service.

f. A list of predominate soils on the site.

g. A tabulation of site information to include net acreage (to nearest 0.1 acre), depth to ground water, annual application rate, lifetime application rate, and buffer zones for occupied dwellings, property lines, roads and wells.

h. A detailed site plan prepared at a scale of one inch equals 12,000 feet or at a scale acceptable to the Department depicting the site boundary, limits of sewage sludge application and homes, wells, irrigation structures and dikes within 100 feet of this site.

i. Representative soil sample analyses for pH, cation exchange capacity, and background metal concentrations. Metal concentrations shall be limited to those levels specified in resolution by Riverside County Board of Supervisors.

j. Only sewage sludge meeting Pollutant Concentration requirements of U.S. EPA 40 CFR, Part 503.13, Table 3, and Class A or Class B pathogen standards may be applied to agricultural land. Sewage sludge laboratory analysis data that the Department considers adequate to assess the potential public health and environmental impacts of the project shall be provided. As a minimum requirement the results of one laboratory analysis for a representative sample of the sewage sludge which meets the following criteria shall be submitted:

   i. The sample was obtained not more than twelve (12) months before submission of the application;

   ii. The analysis includes percent for solids, pH and the dry weight concentration of total organic nitrogen, ammonium, nitrate, total phosphorus, total potassium, arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc.

   iii. The analysis includes the concentration of Total Polychlorinated Biphenyl (PCB).

k. The in-county transportation route from the wastewater treatment plant generating the sewage sludge to the site.

l. Approval of the Regional Water Quality Control Board, as appropriate.

m. Statement by the County Agricultural Commissioner's office, a certified professional agronomist, or other recognized agriculture rate guideline publications indicating the recommended agronomic rates. Such recommendation may be site and crop specific.

n. Any other relevant information requested by the Department.

o. Approval of U.S. Department of Fish and Game on wetlands.

2. Application for Marginal Land Site. The Department will evaluate proposed projects on marginal lands on a case-by-case basis. The projects will be evaluated on technical merit, enhancement of the environment and impact to public health. Fees and approval requirements will be established based on the scope of the projects.

C. Action on Applications for Sewage Sludge Management Plan and Sludge Application Site Approvals for the land application of Class B sewage sludge.

1. Applicants shall be notified of incomplete or inaccurate applications within ten (10) working days after the date of the filing of the application. The applicant may make the proper corrections and resubmit the corrected application. The applicant shall make the necessary corrections and additions and resubmit the application within 30 working days of notification of an incomplete Sewage Sludge Management Plan application. Any Sewage Sludge Management Plan not resubmitted within thirty (30) days shall be considered a new application.

2. All complete and accurate applications for Sewage Sludge Management Plan and Sewage Sludge Application Site Plan Approvals shall be approved or denied, in whole or in part, within fifteen (15) working days after the date of filing or shall be deemed approved by de fault. If an application is denied, in whole or in part, the applicant may amend the application and resubmit the amended application within thirty (30) days.

3. A Sewage Sludge Management Plan or a Sludge Site application may be denied for one or more of the following causes, or for other reasons as specified by the Director:

a. Lack of responsibility as shown by past work.

b. Lack of competency as revealed by financial statements, experience, or inadequate equipment.

c. Inadequate, incomplete, or inaccurate information on the sewage sludge management plan application submitted.

d. Inadequate, incomplete, or inaccurate information on the sewage sludge application site application submitted.

e. The plan fails to comply with CEQA

f. The plan proposes an application that is not environmentally sound.

g. Other reasons as specified by the director.

Written notice of the denial of an application for a new sewage sludge Management Plan or new Sewage Sludge Application Site Approval, shall be given by personal delivery or by mailing by certified mail to the applicant at the address on file with the Department.

D. Insurance

1. The applicator shall, at all times during the term of the approval, maintain in full force and effect workers' compensation insurance, and a minimum of $1,000,000 General Liability insurance, and a minimum of $1,000,000 of pollution insurance. All insurance shall be by insurers and for policy limits acceptable to the County. Before commencement of any work, the Applicator shall furnish the County with certificates of insurance, or other evidence satisfactory to County, indicating that insurance has been procured and is in force. The certificates shall include the following express obligation:

> "This is to certify that the policies of insurance described herein have been issued to the insured for whom this certificate is executed and are in force at this time. In the event of cancellation or material change in a policy affecting the certificate, notice will be given the certificate holder."

2. In the event applicator's insurance coverage fails or lapses, the approval issued hereunder shall terminate immediately, and Applicator shall be deemed in default.

3. Applicator shall be under a duty to promptly notify the Director of any cancellation or non-renewal of insurance coverage.

E. Bonds

1. Security Bond.

Applicator shall furnish a corporate surety bond as security for performance under the approval. The amount of the bond shall be the average of two-months expected gross income derived from transportation and use of sewage sludge in Riverside County. The Department shall have the right to require a surety bond in the above-described amount, such right to be dependent upon the reasonable need thereof, as may be determined by the Director.

2. Premium.

Premium for the above-described bond(s) shall be paid by the Applicator. A certificate from the surety showing that bond premiums have been paid, in full, shall accompany the bond.

3. Authorized Company.

The surety on the bond shall be a company acceptable by the County and shall be a corporate surety company authorized to do business in the State of California.

F. Conditions For Operations

1. Sewage Sludge Quality.

Only Class B sewage sludge that also meets the EPA's 40 CFR, Part 503, Subpart D, § 503.13, Table 3 Pollutant Concentrations shall be used.

2. Sewage Sludge Incorporation.

Class A and Class B sewage sludge shall be incorporated into the soil by discing or other suitable tillage method within 24 hours from the time of application. Sewage sludge shall be thoroughly incorporated into the soil, including residues in staging areas within the above required time frames.

3. Tail Water Control.

Tail water shall not be discharged from any field on which sewage sludge has been applied unless such discharge has been approved by the Department.

4. Spill Control.

The applicator shall establish and maintain an ongoing spill prevention and response program.

5. Allowable Crops.

Sewage sludge may be used on crops as defined under the U.S. EPA 40 CFR, Part 503.32(b)(5) and this ordinance.

6. Sewage Sludge Use Agreements.

The applicator shall obtain written evidence that the grower and land owner are desirous of receiving sewage sludge and that they both agree to observe resting periods, and crop restrictions as established in resolution of the Board of Supervisors.

7. Site Restrictions. where crops are established and harvested, and marginal lands

Sewage sludge use shall be limited to bona fide agricultural, horticultural, and silvacultural sites as approved by the Director and certified by the agricultural commissioner. Sewage sludge may be reapplied each time a crop is harvested or annually in the case of perennial crops (i.e. pasture lands). A crop shall be planted within 18 months from the first date of sewage sludge application on a site unless approval is obtained by the Director allowing for a longer time frame.

Resting periods, as established by resolution of the Board of Supervisors, shall be observed for sites receiving sewage sludge. The applicator shall physically inspect sites receiving sewage sludge at least annually and certify to the Department that appropriate site restrictions are observed. Any resting period violation observed by the applicator shall be reported to the Department within seven (7) days from the date of discovery.

8. Advance Site Notice.

The applicator shall notify the Director in writing at least 24 hours prior to delivery of sludge to the site.

9. Site Identification.

The areas to receive sewage sludge application shall be clearly marked with stakes or other prominent markers as approved by the Department before the sewage sludge application.

10. Buffer Zones

The Department may require more restrictive buffer zone distances than those described in Section 3. Prohibitions, and may set buffer zones between sewage sludge application areas based on: adjacent land uses, existing condition of ground water or surface water, sludge application rates, water content of the sludge, slope of the land, soil permeability and other factors that the Department deems relevant to the protection of public health and the environment. In making this determination, the Department may consider adjacent application rates, sewage sludge quality, land slopes, vegetated filler strip and other factors considered relevant by the Department.

11. Maintenance Yard.

If the applicator's maintenance yard(s) are within Riverside County, the applicant shall insure that:

a. Sewage sludge transportation vehicle parking / service yards shall be maintained in a clean and safe condition.

b. Vehicle washing facilities that drain to an approved subsurface disposal system shall be required. The entire lot shall be adequately sloped for drainage control.

12. Vehicles.

a. Each vehicle shall have clearly visible, on each side, the identity and telephone number of the Applicator or DBA, in a size with letters of not less than three (3) inches in height.

b. Maintenance and repair work shall be logged and shall be made available for inspection by the Director at reasonable times.

c. Vehicles shall meet all emission standards and limits on noise.

d. Vehicles shall be designed and maintained in such a manner as to prevent leakage of liquids or spilling, blowing or loss of material during transportation.

e. Vehicles shall carry a shovel, broom, fire extinguisher, and first aid kit.

f. Sewage Sludge Transportation. Vehicles transporting sewage sludge shall be maintained in a neat and clean

condition and in sound mechanical condition. All loads shall be fully tarped. Vehicle exteriors shall be free of sewage sludge before entering public roads.

g. Vehicle Conditions. All vehicles shall meet California Department of Transportation requirements and shall be equipped with effective communication equipment so as to maintain contact with the Applicator's office.

h. California Highway Patrol Inspection. Applicator shall cause its vehicles to be inspected by the California Highway Patrol annually or as required by the Department of Transportation and a report of said inspection shall be provided to the Director upon request.

i. Licenses and Taxes. The Applicator shall obtain and maintain, at its own expense, all required licenses and approvals and shall promptly pay all taxes required by the City, County, State, and Federal Governments.

j. Department's Review.

i. The Director shall affix a distinctive, durable decal on each vehicle owned and operated by the applicator.

ii. The Director may suspend the use of said decal for any vehicle which fails to meet the requirements of this ordinance. Said vehicle shall not be used for collection, application, transfer, or removal of sewage sludge until it has been cleared in writing by the Director for return to service.

13. Staging Areas.

Sewage sludge staging areas shall be restricted to sites approved for sewage sludge application. Staging areas shall be located out of buffer zones. All sewage sludge within a staging area shall be land applied within 24 hours from time of delivery to the staging area. The staging area shall be sufficiently cleaned of sewage sludge so the application rate within the staging area is equivalent to the approved application rate for the site.

14. Sewage Sludge Storage.

Sewage sludge storage is not allowed except where specifically permitted by Federal, State, and local regulations.

G. Technical Standards.

Technical standards governing sewage sludge application rates, acceptable sewage sludge criteria, cumulative soil metals, etc. shall be established under the U.S. EPA 40 CFR, Part 503 Rule and herewith resolution adopted by the Board of Supervisors.

H. Monitoring.

1. Sewage Sludge Testing.

   The applicator shall submit a monitoring plan as specified by resolution adopted by the Board of Supervisors.

2. Soil Testing.

   The applicator shall conduct sampling which conforms to the procedure specified by resolution adopted by the Board of Supervisors.

I. Reporting.

The applicator shall file monthly reports with the Department within fifteen (15) days from the end of any reporting month in which activity occurs. The monthly report shall include those items specified in resolution by the Board of Supervisors.

J. Sewage Sludge Load Records

The applicator shall create and maintain an accurate record for each load of sewage sludge used in Riverside County. An applicator shall maintain sewage sludge records for a period of at least three (3) years. Such records shall be made available to the Director for the purpose of verifying sewage sludge quantities used. The sewage sludge load record shall note the following:

1. source;
2. date and time picked up;
3. date and time delivered to use site;
4. use site identification;
5. load size; and,
6. vehicle(s) and driver'(s) name.

Section 7. Fees

A. There shall be a fee required to obtain an approval of the Sewage Sludge Management Plan and for a Sewage Sludge Application Site under the provision of this ordinance as specified in a resolution adopted by the Board of Supervisors. Such fees shall be in amounts based upon a cost-analysis determined by the Riverside County Auditor-Controller to be an amount necessary to fully fund the costs incurred by the County in administering this program.

B. There shall also be a monitoring fee for each sewage sludge application site as specified in a resolution adopted by the Board of Supervisors based on the tons of sewage sludge applied at each site. The fees shall be monthly and shall be due by the end of the calendar month following the month application occurred.

C. Fees for both of the above are contained in Riverside County Ordinance No. 640.

D. Delinquency Dates And Penalties

1. The delinquency date shall be, in the case of renewal, the thirtieth (30th) day following the expiration date shown on the Sewage Sludge Management Plan.

2. If any fee specified is not paid prior to the delinquency date, the applicant shall pay, in addition to such fee, a penalty in the amount of twenty percent (20%) for such fee; if any fee specified is not paid within sixty (60) days of the delinquency date, the applicant shall pay in addition to such fee, a penalty in the amount of one hundred percent (100%) of such fee.

Section 8. Term, Renewal, Suspension and Revocation of Sludge Management Plans

A. Approvals granted for Sewage Sludge Management Plans shall be valid for a period not to exceed five (5) years from the date of issuance of said approval, but may be issued for any period of less than five (5) years.

B. Sewage Sludge Management Plan Approvals shall be renewed provided the terms of the initial Sewage Sludge Management Plan continue to be met, the provisions of this ordinance are complied with and the renewal fee is paid.

C. Sewage Sludge Application Site Approvals shall remain valid as long as the Sewage Sludge Management Plan is in force and effect.

D. A Sewage Sludge Management Plan Approval or Sewage Sludge Application Site Approval may be rescinded by the Director whenever the applicator has violated a provision of this ordinance or State or federal laws or regulations , discharge order of the Regional Water Quality Control Board, or is in noncompliance with a resolution of the Board of Supervisors. In such instance, a written notice to this effect shall first be delivered in person or by certified mail to the business address of the applicator appearing on the application. The written notice shall state the grounds for the proposed rescission.

E. The applicator may appeal such rescission of the Director by filing a written request for a hearing before the Board of Supervisors with the Clerk of the Board not more than fifteen (15) calendar days after notice of the proposed rescission has been given. Upon receipt of a written request for a hearing, the Clerk of the Board shall set the matter for public hearing on a date not more than sixty (60) calendar days following receipt of such written request, and shall give the applicant and the Board of Supervisors at least thirty (30) calendar days written notice of the time, date, and place of the hearing. The Board of Supervisors, or a hearing body or officer appointed by it to hear the case, shall issue its written decision and findings on the appeal within thirty (30) calendar days after the close of the hearing. Such decision will be final. Where the approval is rescinded, the applicator shall terminate operations forthwith as determined by the Board of Supervisors.

Section 9. Transferability of Sludge Management Plans

No assignment or transfer whether voluntary or involuntary of the approvals issued under this ordinance or any right thereunder, shall be made in whole or in part by the applicator without the expressed, prior written consent of the Director. A decision on such transferability shall rest within the sole discretion of the Director and shall be issued within thirty (30) calendar days of receipt by the Director of all documentation regarding the proposed transfer.

Section 10. Right of Entry.

The applicator, farm operator, and land owner shall agree, as a requirement of the approval, to authorize the Director at reasonable times and upon presentation of credentials to:

A. Enter upon the applicator's premises or location where any records are required to be kept under the terms and conditions of the approval;

B. Have access to and copy any records required to be kept under the terms and conditions of this approval;

C. Inspect any monitoring equipment or observe any monitoring method required in the approval;

D. Inspect any collection, transport vehicles, treatment, pollution management, or control facilities required under the approval;

E. Enter any site where sewage sludge is proposed to be used or has been used or stored and sample any ground or surface waters, soils, vegetation, sewage sludge or other materials on the site; and,

F. Obtain any photographic documentation or evidence.

Section 11. Public Nuisance Declaration.

In addition, any violation of this ordinance is hereby deemed to be a public nuisance, and may be abated, or enjoined by the Director or his designee, irrespective of any other remedy hereinabove provided.

Section 12. Violations.

Violations by any person, firm, partnership, association, or corporation, whether having obtained approval or not, of any of the provisions of this ordinance, constitutes an infraction or misdemeanor as hereinafter specified. Upon conviction thereof, the person or entity shall be subject to a fine of $100.00 for the first offense; $200.00 for the second violation within a one (1) year period; and $300.00 for each additional violation within the same one (1) year period. Fourth and additional violations within a one year period, shall each constitute a misdemeanor and shall be punishable by a fine not to exceed one thousand dollars ($1,000.00), or six (6) months in jail, or both. Notwithstanding the above, a first or subsequent offense may be charged and prosecuted as a misdemeanor. Payment of any penalty provided herein shall not relieve a person, as defined, of the responsibility of correcting the conditions considered as a separate and distinctive offense.

Section 13. Severability.

If any clause, provision, sentence, or paragraph of this ordinance, or the application thereof, is deemed to be invalid as to any person, entity, establishment, or circumstance, such invalidity shall not effect the other provisions of this ordinance which shall still remain in effect, and to its end, it is hereby declared that the provisions of this ordinance are severable.

Section 14. Applicability

This ordinance shall apply only in the unincorporated areas of Riverside County and in the incorporated cities whose governments have formally adopted this ordinance in whole or in part.

Section 13. Effective Date.

This ordinance shall take effect thirty (30) days after the date of adoption.

[Signature Block on Originals]

GB:jf-1/11/91

APPENDIX C

Directors of Environmental Health

ALAMEDA COUNTY (510) 567-6777 FAX (510) 337-9135

Mr. Mee Ling Tung, Director
Alameda County
Department of Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502-6577

BERKELEY CITY (510) 644-6510 FAX (510) 644-6035

Mr. Alex Schnieder, Chief
Berkeley City Environmental Health
2180 Milvia Street, 3rd Floor
Berkeley, CA 94704

BUTTE COUNTY (916) 538-7282 FAX (916) 538-2165

Mr. Thomas Reid, Director
Division of Environmental Health
Butte County
18 B County Center Drive
Oroville, CA 95965

CALAVERAS COUNTY (209) 754-6399 FAX (209) 754-6459

Brian Moss, Director
Calaveras County Environmental Health
Government Center
891 Mountain Ranch Road
San Andreas, CA 95249

COLUSA COUNTY (916) 458-0397 FAX (916) 458-4136

Mr. Jaime Favila, Director
Colusa County Environmental Health
P.O. Box 610
251 E. Webster Street
Colusa, CA 95932

CONTRA COSTA COUNTY (510) 646-2521 FAX (510) 646-2535

Mr. Dan Guerra, Director
Contra Costa County Environmental Health
1111 Ward Street
Martinez, CA 94553

EL DORADO COUNTY (916) 621-5303 FAX (916) 626-7130

Mr. Ron Duncan, Director
El Dorado County Environmental Health
Community Development Department
360 Fair Lane, Building C
Placerville, CA 95667

FRESNO COUNTY (209) 445-3270 FAX (209) 445-3370

Mr. Gary M. Carozza, Director
Fresno County Environmental Health Services
P.O. Box 11867
1221 Fulton Mall
Fresno, CA 93775

HUMBOLDT-DEL NORTE (707) 445-6215 FAX (707) 441-5699

Mr. Dennis Kalson, Director
Humboldt/Del Norte County Environmental Health
100 "H" Street, Suite 100
Eureka, CA 95501

IMPERIAL COUNTY (619) 339-4203 FAX (619) 352-1309

Mr. Thomas L. Wolf, Director
Imperial County, Division of Environmental
Health Services
939 Main Street
El Centro. CA 92243

INYO COUNTY (619) 878-0238 X 0261 FAX (619) 872-2712

Mr. Robert L. Kennedy, Director
Inyo County Environmental Health
P.O. Box 427
218 East Market Street
Independence, CA 93526

KERN COUNTY (805) 861-3636 FAX (805) 861-3429

Mr. Steve McCalley, Director
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2700 "M" Street, Suite 300
Bakersfield, CA 93301

KINGS COUNTY (209) 584-1141, Ext 2625 FAX (209) 584-6040

Mr. Keith Winkler, Director
Kings County Division of Environmental Health
330 Campus Drive
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LAKE COUNTY (707) 263-2222 FAX (707) 263-1681

Mr. Martin Winston, Director
Lake County Environmental Health
922 Bevins Court
Lakeport, CA 95453

APPENDIX C

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Mr. Doug Ames, Director
Environmental Health
555 Hospital Lane
Susanville, CA 96130

LONG BEACH CITY (310) 570-4000 FAX (310) 570-4049

Mr. Donald D. Cillay, Director
Long Beach City Environmental Health
2525 Grand Avenue
Long Beach, CA 90815

LOS ANGELES COUNTY (213) 881-4000 FAX (213) 262-0641

Mr. Arturo Aguirre, Deputy
Los Angeles County Environmental Health
2525 Corporate Place, 1st Floor
Monterey Park, CA 91754

MADERA COUNTY (209) 675-7823 FAX (209) 661-4213

Mr. James C. Blanton, Director
Madera County Environmental Health
135 West Yosemite Street
Madera, CA 93637

MARIN COUNTY (415) 499-6907 FAX (415) 507-4120

Mr. Edward J. Stewart, Director
Marin County Environmental Health Services
Health and Human Services Dept.
Marin Civic Center, Room 276
San Rafael, CA 94903

MENDOCINO COUNTY (707) 463-4466 FAX (707) 463-4673

(C/O General Svcs)
Mr. Gerald F. Davis, Director
Mendocino County Environmental Health
Mendocino County Courthouse
Ukiah, CA 95482

MERCED COUNTY (209) 385-7391 FAX (209) 384-1593

Mr. Jeff H. Palsgaard, Director
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P.O. Box 471
385 East 13th Street
Merced, CA 95340

MONTEREY COUNTY (408) 755-4540 FAX (408) 757-9586

Mr. Walter F. Wong, Director
Monterey County Environmental Health
1270 Natividad Road
Salinas, CA 93906

NAPA COUNTY (707) 253-4471 FAX (707) 253-4176

Mr. Trent Cave, Director
Napa County Department of Environmental Management
1195 Third Street, Room 205
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NEVADA COUNTY (916) 265-1452 FAX (916) 265-7056

Mr. Tim Snellings, Director
Nevada County Department of Environmental Health
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Nevada City, CA 95959-6100

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PASADENA CITY (818) 405-4390 FAX (818) 405-4711

Mr. Mel Lim, Environmental Health Coordinator
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100 N. Garfield Street, Room 136
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Mr. Richard H. Swenson, Director
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Mr. William F. Crigler, Director
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P.O. Box 480
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Mr. John M. Fanning, Director
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4065 County Circle Drive
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SACRAMENTO COUNTY (916) 386-6168 FAX (916) 386-7040

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SAN BERNARDINO CO. (909) 387-4688 FAX (909) 387-4323

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San Bernardino, CA 92415-0160

SAN DIEGO COUNTY (619) 338-2222 or 2211 FAX (619) 338-2174

Mr.Dan Avera, Deputy Director
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SAN FRANCISCO CITY AND COUNTY (415) 554-2795 FAX (415) 554-2848

Mr. Ben R. Gale, Director
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101 Grove Street, Room 217
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APPENDIX C

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SAN LUIS OBISPO CO (805) 781-5544 FAX (805) 549-4211

Mr. Kurt Batson, Director
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SAN MATEO COUNTY (415) 363-4715 FAX (415) 363-7882

Mr. Brian J. Zamora, Director
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SANTA BARBARA CO. (805) 681-4939 FAX (805) 681-4901
Mr. Gary Erbeck, Director
Attn: Amanda
Santa Barbara County Health Care Services Department
120 Cremona Drive, Building C
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SANTA CLARA COUNTY (408) 299-6060 FAX (408) 298-6261

Mr. Lee E. Esquibel, Director
Santa Clara County Environmental Health Services
P.O. Box 26070
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SANTA CRUZ COUNTY (408) 454-2022 FAX (408) 454-3128

Ms. Diane L. Evans, Director
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SHASTA COUNTY (916) 225-5787 FAX (916) 225-5807

Mr. James Smith, Director
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SISKIYOU COUNTY (916) 842-8230 FAX (916) 842-8093

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STANISLAUS COUNTY (209) 525-4158 FAX (209) 525-4163

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SUTTER COUNTY (916) 741-7400 FAX (916) 741-7109

Ms. Dana Wiyninger, Director
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Director
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TUOLUMNE COUNTY (209) 533-5966 FAX (209) 533-5994

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Mr. Lewis Pozzebon, Director
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Mr. Thomas Y. To, Director
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Mr. Patrick Gavigan, Director
Yuba County Environmental Health
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Marysville, CA 95901

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Mr. Michael W. Isreal, Deputy Director
Land Use Section
Environmental Health Department
217 Rex Avenue, Suite 15
Jackson, CA 95642

APPENDIX D

[Date]

«FirstName»«LastName»«JobTitle»
«Company»
«Address1»
«City»«State»«PostalCode»

RE: Statewide Survey Regarding the Regulation of the Land Application of Sewage Sludge by Local Environmental Health Programs

Dear «Title» «LastName»

The purpose of this letter is to introduce you to the attached survey questionnaire which is being sent to 53 Environmental Health Directors throughout California. The intent of the survey is to gather data as to how various Environmental Health Programs regulate the land application of sludge within their jurisdictions.

The 17 questions in this survey are seeking general information about your city or county, the role of public participation in developing your sludge regulation program, how your sludge management program is implemented, and your views on the appropriate level of government (Federal, State, or Local) that should regulate the beneficial reuse of sewage sludge. Even if the land application of sewage sludge is not an issue in your jurisdiction please answer as many questions as are applicable.

The data obtained from this survey will be incorporated into my Graduate Research Project to fulfill a requirement for my Master of Public Administration degree. The results will be used statistically for comparative purposes only and will not disclose the name of the county or city providing the data.

Along with the attached survey is a stamped return envelope to help expedite your reply. I would appreciate receiving your response by July 18, 1996.

Thank you for taking the time to answer the survey. If you have any questions regarding the questionnaire, please call me at (909) 275-8980.

Sincerely,

Bill Prinz, R.E.H.S.

enclosures (1 survey questionnaire, 1 stamped return envelope)

APPENDIX D

Statewide Survey Regarding the Regulation of the Land Application of Sewage Sludge by Local Environmental Health Programs

Section 1

Please carefully read the following questions in Section 1 and select the best answer that most accurately describes your jurisdiction. (The term "sewage sludge" as used in this questionnaire refers to Class B or PFRP sewage sludge from a waste water treatment plant and not to compost made from sewage sludge).

Question 1 -- Which of the following general categories best describes the setting of your County or City? (Select only one answer)

- ☐ Urban/Industrial
- ☐ Urban/Suburban
- ☐ Suburban/Rural
- ☐ Rural/Agricultural
- ☐ None of the above

Question 2 -- The beneficial reuse of sewage sludge is used primarily for the following purposes in your City or County? (Select only one answer)

- ☐ Agricultural soil amendment or fertilizer
- ☐ Land reclamation soil amendment
- ☐ None of the above

Please select the answer to the following three questions which most accurately describes your experiences with the land application of sewage sludge in your jurisdiction :

Question 3 -- Has your agency received inquiries or complaints from the public reporting nuisances or health concerns about the practice of using sewage sludge as a soil amendment? (Select only one answer)

- ☐ Yes, a lot of complaints and/or inquiries (about one or more per month)
- ☐ Occasionally (about five to ten complaints and/or inquiries per year)
- ☐ Rarely (between one to five complaints and/or inquiries per year)
- ☐ No, we've never received any complaints about this issue.

Question 4 -- Have concerned citizens or organized environmental groups demanded that your agency take action to control or prohibit the land application of sewage sludge in your jurisdiction? (Select only one answer)

- ☐ Yes, there has been a significant demand from the public for local regulation of the land application of sewage sludge.
- ☐ Yes, there has been some demand from the public for local regulation of the land application of sewage sludge, but not a great deal.
- ☐ No, there has not been an organized effort to demand local government to regulate the land application of sewage sludge.

Question 5 -- Has the local governing body (Board of Supervisors or City Council) adopted an ordinance to regulate the land application of sewage sludge in your jurisdiction? (Select only one answer)

- ☐ Yes (*if you answered "Yes" please respond to all of the remaining questions in this questionnaire*)
- ☐ No (*if you answered "No" please skip questions #6 through #14 [Section 2] and commence answering questions #15 through #17 [Section 3]*)

Section 2

If you selected the "Yes" answer for question 5 please complete answering all the remaining questions in the survey. If you selected the "No" response please skip questions 6 - 14 and continue answering the survey at question 15.

Question 6 -- Was the local ordinance for regulating the land application of sewage sludge in your jurisdiction adopted in any way as a result of grassroots political pressure placed on the local governing body? (Select only one answer)

- ☐ Yes
- ☐ No
- ☐ Not Sure

Question 7 -- Does your local ordinance allow your agency to issue permits for the land application of sewage sludge by an approved, qualified operator? (Select only one answer)

- ☐ Yes
- ☐ No
- ☐ Not applicable

Question 8 -- Which of the following parties are required to obtain a permit under your jurisdiction's ordinance? (select any that apply):

- ☐ Sewage sludge transporters
- ☐ Sewage sludge applicators
- ☐ Land owners (i.e., farmers or land reclamation project owners)
- ☐ None of the above
- ☐ Other

Question 9 -- Does your agency conduct inspections of sewage sludge transportation vehicles? (Select only one answer)

- ☐ Yes
- ☐ No
- ☐ Not applicable

Question 10 -- Does your agency periodically sample sewage sludge that is delivered to land application sites to assure that levels of heavy metals and/or pathogens are below regulatory thresholds? (Select only one answer)

- ☐ Yes
- ☐ No
- ☐ Not applicable

Question 11 -- Does your agency periodically take soil samples from fields before sewage sludge is applied to verify whether it has exceeded the cumulative loading rates and/or annual loading rates for heavy metals? (Select only one answer)

- ☐ Yes
- ☐ No
- ☐ Not applicable

Question 12 -- Does your jurisdiction's ordinance establish set back requirements limiting the placement of sewage sludge around water wells, surface water sources, occupied dwellings, and other sensitive sites? (Select only one answer)

- ☐ Yes
- ☐ No
- ☐ Not applicable

Question 13 -- Does your jurisdiction's ordinance establish resting periods (i.e. site restrictions) that limit the time between the placement of sewage sludge and the harvesting of crops which are enforced by your agency? (Select only one answer)

- ☐ Yes
- ☐ No
- ☐ Not applicable

Question 14 -- Which of the following sources provide revenue for your program to regulate the land application of sewage sludge?(Check all that apply to your program):

- ☐ Permit processing fees for new applications
- ☐ Annual permit renewal fees for sewage sludge applicators
- ☐ Annual permit renewal fees for sewage sludge transporters
- ☐ Tonnage fees for sewage sludge applied to the sites
- ☐ General Fund
- ☐ None of the above

Section 3

Please choose the answer to the following questions most accurately describes your opinions regarding the regulation of the land application of sewage sludge in your jurisdiction:

Question 15 -- State government agencies (i.e. Regional Water Quality Control Board, California Integrated Waste Management Board and/or the Department of Food and Agriculture) should have primary authority and responsibility over regulating the land application of sewage sludge. (Select only one answer)

- ☐ Strongly agree
- ☐ Agree
- ☐ No Opinion
- ☐ Disagree

☐ Strongly Disagree

Question 16 -- Local government should have primary authority and responsibility for the administration of programs regulating the land application of sewage sludge. (Select only one answer)

☐ Strongly agree
☐ Agree
☐ No Opinion
☐ Disagree
☐ Strongly Disagree

Question 17 -- The current level of regulation in my jurisdiction for governing the land application of sewage sludge is adequate to provide protection to public health and the environment. (Select only one answer)

☐ Strongly agree
☐ Agree
☐ No Opinion
☐ Disagree
☐ Strongly Disagree

Thank you for participating in this survey. If you wish to make any additional comments feels free to write in the space below.

WORKS CITED BY CATEGORY

Books

Anderson, J.E. Public Policy-Making, 2nd Edition. New York: Holt, Rinehart, and Winston 1979.

Babbie, E. The Practice of Social Research, 6th Edition. Belmont, CA: Wadsworth Publishing Company 1989.

Bardach, E. The Implementation Game: What Happens After a Bill Becomes Law. Cambridge, MA: MIT Press, 1977.

Berglund, S., R.D. Davis and P. L'Hermite. The Use of Sludge on Land: Rates of Application and Long-Term Effects of Metals. Boston: D. Reidel Publishing Company, 1984.

Bramwell, A. Ecology in the 20th Century: A History. New York: Yale University Press, 1989.

Carson, R.L. Silent Spring. New York: Houghton Mifflin, 1962.

Dahl, R.A. A Preface to Democratic Theory. Chicago: University of Chicago Press, 1956.

Dewey, J. The Public and its Problems. Denver: Alan Swallow, 1927.

Easton, D., A Framework for Political Analysis. Englewood Cliffs, NJ: Prentice-Hall, Inc. 1965.

Gore, A. Earth in the Balance: Ecology and the Human Spirit, New York: Houghton Mifflin Company, 1992.

Ham, C. and M. Hill, The Policy Process in a Modern Capitalist State. Sussex, UK: Wheatsheaf, 1984.

Hawken, P. The Ecology of Commerce: A Declaration of Sustainability, (New York: HarperCollins Publishers, Inc., 1993.

Hays, S.P. Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985. Cambridge: Cambridge University Press, 1987.

Jones, C.O. An Introduction to the Study of Public Policy, 2nd Edition. North Scituate, MA: Duxbury Press, 1977.

Kamieniecki, S., R.M. O'Brien, and M. Clarke. Controversies in Environmental Policy, Albany, NY: State University of New York Press 1986.

Leeper, G.W. Managing the Heavy Metals on the Land. New York: Marcel-Dekker, 1978.

Marcus, A.A. Promise and Performance: Choosing and Implementing an Environmental Policy. Westport, CN: Greenwood Press, 1980.

Mazmanian, D.A. and P. A. Sabatier, Implementation and Public Policy. Glenview, IL: Scott Foresman and Company, 1983.

Mortved, J.J. Fertilizer Applications for Correcting Micronutrient Deficiencies in Agriculture, Madison, WI: American Society of Agronomy, Soil Science Society of America Book Series No. 4, 1991.

National Assocociation of State Universities and Land Grant Colleges, Proceedings of the Joint Conference on Recycling Municipal Sludges and Effluents on Land. Washinton, D.C: National Assocociation of State Universities and Land Grant Colleges, 1973.

National Research Council. Use of Reclaimed Water and Sludge in Food Crop Production. Washington, D.C: National Academy Press, 1996.

Page, A.L., T.L. Gleason, III, James E. Smith, Jr. ,I.K. Iskandar, and L.E. Sommers. Utilization of Municipal Wastewater and Sludge on Land. Riverside, CA: University of California, Riverside 1983.

Piasecki, B. and P. Asmus, In Search of Environmental Excellence: Moving Beyond Blame. New York: Simon and Schuster, Inc. 1990.

Portney, K.E. Controversial Issues in Environmental Policy: Science vs. Economics vs. Politics, Newbury Park, CA: Sage Publications, 1992.

Pressman, Jeffery and Aaron Wildavsky, Implementation: How Great Expectations in Washington are Dashed in Oakland, Berkely, CA: University of California Press, 1973.

Quade, E.S. Analysis for Public Decisions: Revised edition by Grace M. Carter, Third Edition. Englewood Hills, NJ: Prentice Hall, 1989.

Rapp, B.W. and F.M. Patitucci, Managing Local Government for Improved Performance: A Practical Approach. Colorado: Westview Press, 1977.

Rosenbaum, W.A. Environmental Politics and Policy. Washington D.C: CQ Press, 1991.

_____. Environmental Politics and Policy, Third Edition. Washington, D.C: CQ Press, 1995.

Russell, C., W. Harrington and W. J. Vaugn, Enforcing Pollution Control Laws. Washington, D.C: Resources for the Future, 1986.

Sale, K. The Green Revolution: The American Environmental Movement 1962-1992. New York: Hill and Wang, 1993.

Truman, D.B. The Governmental Process. New York: Knopf 1951.

Vig, N.J. and M. Kraft. Environmental Policy in the 1990s, 2nd Ed. Washington D.C: CQ Press, 1994.

Yandle, B. The Political Limits of Environmental Regulation: Tracking the Unicorn. New York: Quorum Books, 1989.

Younis, T. Implementation in Public Policy. Brookfield, VT: Gower Publishing Company, 1990.

Government Documents

Clean Water Act, U.S. Code, Vol. 33, sec. 101(A) 1972.

Sepp, E. Manual of Good Practice for Landspreading of Sewage Sludge. Sacramento, CA: California Department of Health Services, Sanitary Engineering Branch, 1983.

U.S. Environmental Protection Agency. Process Design Manual-Land Application of Municipal Sludge. Cincinnati, OH: Municipal Environmental Research Laboratory, 1983.

_____. 40 CFR Part 503. "National Sewage Sludge Survey" *Fed. Regist.* 54:23, 1989.

_____. 40 CFR, Part 503, Standards for the Use or Disposal of Sewage Sludge; Section 503.32(b)(5)(i). 58:32, 1993.

_____. A Plain English Guide to the EPA Part 503 Biosolids Rule. Washington, D.C: Office of Wastewater Management, 1994.

_____. Biosolids Recycling: Beneficial Technology for a Better Environment. Washington D.C: 1994.

Journals

Downs, A. "Up and Down with Ecology: The Issue Attention Cycle" The Public Interest, 2,38-50, 1972.

Flicker, J. "Local Voices in a National Debate" Audubon, January-February 1996.

Gold, S.D. and S. Ritchie, "State Actions Affecting Cities and Counties, 1990-1993: De Facto Federalism," Public Budgeting and Finance Summer 1994.

Goldstein, N. "EPA Streamlines Biosolids Management Programs", Biocycle: Journal of Composting and Recycling, Vol. 36, No. 7, 1995.

Hedge, D.M. and M. J. Scicchitano, "Regulating in Space and Time: The Case of Regulatory Federalism", The Journal of Politics. 56(1), 1994.

Lake, R.W. "Central Government Limitations on Policy Options for Environmental Protection", Professional Geographer, 46(2), 1994.

Logsdon, G. "Beneficial Biosolids", Biocycle: Journal of Waste Recycling, Vol. 34, No. 2, 1993.

McBride, M.B."Toxic Metal Accumulation from the Agricultural Use of Sludge: Are USEPA Regulations Protective?", Journal of Environmental Quality, 24:5-18, 1995.

Sholz, J.T. and F. H. Wei, "Regulatory Enforcement in a Federalist System", American Political Science Review, December 1986.

Van Meter, D.S. and C.E. Van Horn, "The Policy Implementation Process: A Conceptual Framework". Administration and Society. Vol. 6 No. 4, 1975.

Newspaper Articles

Garcia, R. "Residents Speak Minds" Palo Verde Times. 9 February 1990.

Hyduke, J. "Farm Use of Sludge Debated" The Riverside County Press Enterprise, 14 February 1990.

Hyduke-Spraggins, K. "Sludge, Pelicans cause problems in Palo Verde" Palo Verde Times, 28 February 1990.

Miller, K. "Suddenly, Environment is Huge Issue for Presidential Hopefuls", The San Bernardino County Sun, Thursday, 20 June 1996, page A4.